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W. G. FARLOW.

ERYTHEA

A JOURNAL OF BOTANY, WEST AMERICAN AND GENERAL.

EDITED BY

WILLIS LINN JEPSON

AND OTHERS, OF THE DEPARTMENT OF BOTANY,
UNIVERSITY OF CALIFORNIA.

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A MONTHLY journal of Botany, edited by members of the Department of Botany at the University of California. Devoted to every department of botanical investigation and criticism. . . Historical papers, general articles on systematic and geographic botany, and reviews of new literature, will continue to be features of the journal.

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OBSERVATIONS ON THE COMPOSITÆ.—X.

By Edward L. Greene.

With species No. 8, on page 96 preceding begins the succession of four shrubs, all differing, each in its own way, from the best type of Chrysothamnus. They are all, nevertheless, best retained here, at least until better known.

9. **C. pulchellus.** *Linosyris pulchella*, A. Gray, Pl. Wright. i. 96 (1852). *Bigelovia pulchella*, A. Gray, Proc. Am. Acad. viii. 643 (1873). Tall and freely branching, the bark quite white: leaves narrowly linear, obtuse, glabrous: heads ¾ inch long: large 5-angled achenes glabrous; pappus very firm, copious and accrescent.

Plant of most peculiar aspect, quite suggestive of the Eupatoriaceous genus *Carphochæte* which inhabits the same region. No other *Chrysothamnus* has such a pappus.

10. C. depressus, Nutt. Pl. Gamb. 171 (1848). *Linosyris depressa*, Torr. in Sitgr. Rep. 161. *Bigelovia depressa*, A. Gray, l. c. Of the same general region with the preceding, though of more northerly range, and allied to it.

11. **C. albidus.** *Bigelovia albida*, M. E. Jones, in Gray, Proc. Am. Acad. xvii. 209 (1882). A most anomalous species, not only by its white flowers. Its corolla is deeply cleft as in no other *Chrysothamnus*. The leaves are almost terete and not indistinctly punctate as well as very glutinous. The shrub were almost as well referred to the genus *Chrysoma;* but its involucre is more like that of certain *Chrysothamni*, namely those here placed toward the end of the series.

All the shrubs that follow are still more notably, are more concordantly, diverse from the typical Chrysothamnus. They are of coarser and more broom-like growth, with softer more pithy wood, and the stems are usually clothed at least when young, with a dense white tomentum. The twigs and foliage, when bruised, exhale a disagreeable odor of which there is no trace in the typical group. The corollas are usually if not always nearly destitute of a proper limb, the throat being elongated and almost or quite claviform, with only short suberect teeth in place of the usual larger and more or less spreading segments, and the style-tips are as commonly, perhaps quite invariably, elongated and filiform like those of the genus *Macronema*, the one discoid species of which is often mistaken by the inexperienced for "*Bigelovia Bolanderi*" which differs from this group of *Chrysothamnus* by its involucre only.

I have long been in a state of hesitancy as to whether this group should not be received as generically distinct from true *Chrysothamnus*. And again, if these shrubs do not belong to this genus, there is room for dispute as to whether they should form a genus by themselves, or be referred to *Macronema*, or to the South American *Dolichogyne*, to which last they bear a striking general resemblance. But the types of *Dolichogyne* have peculiar style-tips, rather too unlike those of any of our plants; and the bristles of the pappus are perceptibly flattened. But for these two peculiarities of *Dolichogyne* I should relegate to it all the following:

12. **C. graveolens.** *Chrysocoma graveolens*, Nutt. Gen. ii. 136 (1818). *Linosyris graveolens*, T. & G. Fl. ii. 234 (1842). *Bigelovia graveolens*, var. *glabrata*, A. Gray, Proc. Am. Acad. viii. 645 (1873). *Chondrophora nauseosa glabrata*, Rydb. Mem. Torr. Club, v. 317 (1894). *Bigelovia dracunculoides*, DC. Prodr. v. 329 (1836). *Chrysothamnus dracunculoides*, Nutt. Trans. Am. Phil. Soc. 325 (1840). Stout, very leafy almost glabrous shrub usually 3 or 4 feet high, the numerous long branches ending in an ample rounded cymose corymb, the branches of which are more or less tomentulose; leaves ascending, narrowly linear, very acute, 2 or 3 inches long, obscurely 3-nerved, glabrous: involucral bracts about 4 in each vertical rank, acute, glabrous even to the margin: corolla with slender tube glabrous or with a few short hairs; the

nearly cylindric throat cleft a fourth to a third the way down; pubescence of the achenes abundant, long, appressed, not very fine : style-appendages at least twice the length of the stigmatic portion.

Abundant on alkaline plains east of the Rocky Mountains, from the upper Arkansas and Platte, ranging northeastward to Dakota, then westward along the line of the British boundary possibly as far as British Columbia. Apparently not in the Great Basin unless eastwardly about Salt Lake.

It was doubtless this species which Pursh mistook for the Asiatic *Chrysocoma dracunculoides* (now *Aster dracunculoides*) and which in consequence of this error became *Bigelovia dracunculoides*, DC., and *Chrysothamnus dracunculoides*, Nutt.

13. C. SPECIOSUS, Nutt. Trans. Am. Phil. Soc, vii. 323 (1840). *Chrysocoma nauseosa*, Pall. in Pursh Fl. ii. 517 (1814)?? Size of the preceding, but stems more slender, inflorescence more open : leaves very narrowly linear, and with the branchlets of the inflorescence minutely white-tomentose : involucral bracts firm, acutish, not ciliate, tomentose on the back, or the inner ones glabrous except near the tip, all in vertical ranks of 3 or 4: corolla with slender almost glabrous tube rather longer than the subcylindric throat, this cleft a third of the way down : pappus copious, fine, only delicately scabrous, fuscous at least in age.

A far-western species, the type being of the upper Missouri, but common in Idaho, eastern Oregon, northwestern California and adjacent Nevada. Easily distinguished from *C. graveolens* by its slender habit, and almost filiform white leaves.

Var. ALBICAULIS Nutt. l. c. *Linosyris albicaulis*, T. & G. Fl. ii. 234 (1842). *Bigelovia graveolens*, var. *albicaulis*, A. Gray, Proc. Am. Acad. l. c., not of Bot. Calif. Stem and Branches densely lanate-tomentose ; foliage as in the type : tube of corolla clothed with delicate long-villous or somewhat arachnoid hairs.

Evidently a rare plant of northern Idaho or some neighboring region, which as late as 1873, according to Gray, had been collected only by Nuttall and by Burke; in the *Botany of the California State Survey*, he wrongly referred here a certain shrub of the Sierra Nevada which had been collected by myself.

Var. **gnaphalodes.** *Bigelovia graveolens* var. *hololeuca.* A. Gray, l. c. (1873)? Very tall, often 5 feet high, the whole shrub, even to the involucre, white with woolly tomentum; bracts often 4 in each vertical rank, margins not ciliate: throat of corolla claviform, the teeth only a fourth its length: corolla-tube not hairy.

Common in the deserts of middle and southern Nevada, from Pyramid Lake, Mrs. Curran, to Esmerelda Co., Mr. Shockley. The type of Gray's var. *hololeuca* was from Owen's valley, within the borders of California; but to this was assigned a cobwebby hairy corolla tube, just the character of var. *albicaulis*, perhaps by mistake.

Var.(?) **latisquameus.** *Bigelovia graveolens*, var. *latisquamea*, A. Gray, l. c. Tall, white-tomentose as to stem and foliage, but involucre less so: leaves fewer and shorter than in other forms, the inflorescence fastigiate, more open: inner bracts broad, thin, very obtuse: throat of the corolla shorter and broader, the teeth very short: pappus permanently white.

Southern New Mexico, near the old copper mines, Bigelow, Henry, and the present writer. Probably a distinct species.

Var. (?) **Arizonicus.** Tall and very stout, rather sparingly leafy, very white and tomentose: leaves 1 or 2 inches long, narrowly linear: outer tracts of involucre tomentose, acute, the inner obtuse: very slender corolla tube with a few clavellate spreading hairs; throat campanulate-funnelform, hardly more than a fourth as long as the tube and cleft rather deeply.

Santa Rita Mountains, southern Arizona, Brandegee. Perhaps on the strong characters of the corolla alone this should be admitted to specific rank.

Var. (?) **Plattensis.** Low and merely suffrutescent; seldom a foot high, very leafy, the long narrowly linear white-tomentose leaves spreading or recurved: involucral bracts about 3 in each vertical rank, acute, glabrous except that the margins are rather densely woolly-ciliate: tube of corolla somewhat pubescent; throat elongated, rather deeply cleft.

Plentiful on alkaline plains of the Platte and elsewhere along the eastern base of the Rocky Mountains; associated with *C. graveolens*, but very distinct from that, flowering earlier; referable to *C. speciosus* unless a distinct species. This will probably be the *Chondrophora nauseosa* of Britton Mem. Torr. Club. v. 317.

14. **C. Californicus.** *Bigelovia graveolens*, var. *albicaulis* A. Gray, Bot. Calif. i. 317 (1876) as to the Californian plant, but not as to the description, nor of Proc. Am. Acad. (1873). Stout and rather low, seldom 2 feet high; flowering branches densely white-tomentose, the foliage also usually so; heads mostly in a somewhat ample terminal pyramidal panicle: leaves numerous, spatulate-linear or narrowly oblanceolate, 2 inches long or more, acutish; carinate by a rather strong and prominent midvein: heads large, often 7 or 8 lines high; involucre and the pedicels distinctly glandular-puberulent, often also tomentulose; bracts about 3 in each vertical rank, all acute: corolla 5 lines long, the slender sparsely short-hairy tube not as long as the subcylindric rather deeply cleft throat; filiform style-appendages scarcely longer than the stigmatic part: achenes with a dense but short appressed pubescence; pappus dull-white, hardly scabrous.

Common in the higher Sierra Nevada of Placer and Nevada Counties, California, and very distinct from all forms of *C. speciosus* by its low stout habit, broad leaves, glandular involucres, etc. It is solely on the strength of a glabrate-leaved state of this that "*Bigelovia graveolens* var. *glabrata*" has been credited to California.

Var. **occidentalis.** More slender and taller; stems less tomentose; leaves narrower but distinctly and rather broadly linear: heads not as long; bracts of involucre abruptly and somewhat cuspidately acute.

In the Coast Range, from Humboldt County southward. Plant not well known.

The species succeeding, are distinguished by a more thyrsiform arrangement of the heads, and with the exception of the last one, by a more sparse and less elongated foliage.

15. **C. frigidus.** *Chrysocoma nauseosa,* Pall. in Pursh?? Stoutish, seldom 2 feet, often less than one foot high, the branches of the season erect, numerous, whitish-tomentose: leaves narrowly linear, seldom 2 inches long, acute, erect or ascending, distinctly white-tomentose, seldom glabrate: heads mostly thyrsoid-panicled, 4 or 5 lines high, bracts in not very distinct vertical ranks, the outer acute, the inner obtusish, all more or less tomentulose and glandular, the margins delicately ciliate at least near the summit: corolla-tube sparingly short-hairy, not at all elongated, widening gradually to the abruptly subclaviform rather deeply cleft throat: style-appendages much longer than the wholly included stigmatic part.

Plentiful on the elevated bleak plains about Laramie, Wyoming, and eastward to the borders of Utah. Without knowledge of the type specimens it is impossible to say whether this plant or our number 13 is the basis of the scarcely published *Chrysocoma nauseosa* of Pursh's Flora.

16. **C. Bigelovii.** *Linosyris Bigelovii,* A. Gray, Pac. R. Rep. iv. 98, t. 12 (1857). *Bigelovia Bigelovii,* A. Gray, Proc. Am. Acad. l. c. 642 (1873). *Aster binominatus,* O. Ktze. Rev. Gen. 315 (1891). Size of the preceding, but erect branches of the season quite slender, reedy and very sparsely leafy: leaves short, involute; involucral bracts in very distinct vertical ranks and numerous (4 or 5 in each rank).

Dry plains of southeastern Colorado and adjacent New Mexico.

17. **C. junceus.** *Bigelovia juncea*, Greene, Bot. Gaz. vi. 184 (1881). *Aster Edwardii* O. Ktze, l. c. 316. Taller and more slender, the broom-like tufts of long erect rush-like branches green and nearly or quite leafless : heads in small fastigiate cymes at summit of the branches ; involucral bracts in vertical ranks, all obtusish : corolla-lobes short, hairy.

Collected only by the present writer, many years since, on bluffs of the Gila River in southeastern Arizona.

18. **C. Mohavensis.** *Bigelovia Mohavensis*, Greene, in Gray, Syn. Fl. 138 (1884). *Aster Mohavensis*, O. Ktze, l. c. 318. Rush-like branches few, stout, flexuous, glutinous, sparingly leafy : leaves an inch long : involucral bracts obtuse : corolla-lobes narrowly lanceolate, glabrous.

Mohave Desert in California ; also in adjacent Nevada.

19. **C. leiospermus.** *Bigelovia leiosperma.* A. Gray, Syn. Fl. 139 (1884). *Aster leiospermus*, O. Ktze, l. c. very like the last in habit and aspect ; readily distinguished by the very short ovate teeth of the corolla, and the completely glabrous achenes.

Southern portions of Nevada and Utah.

20. **C. Parryi.** *Linosyris Parryi*, A. Gray, Proc. Philad. Acad. 66 (1863). *Bigelovia Parryi*, A. Gray, Proc. Am. Acad. l. c. *Aster Harbourii*, O. Ktze, l. c. 316. Stout, a foot high or more, quite leafy, and with ascending branches: leaves linear, narrowed at base, 2 inches long or more, somewhat tomentose like the branches, or glabrate: heads quite thyrsoidly disposed up and down the branches, large, 10 to 15-flowered; involucral bracts lanceolate, attenuate-acuminate: corolla-tube hirsutulous.

Parks of the Colorado Rocky Mountains.

21. **C. Howardii.** *Linosyris Howardii*, Parry in Gray, Proc. Am. Acad. vi. 541 (1865). *Bigelovia Howardii*, A. Gray, l. c. viii. 641 (1873). *Aster Howardii*, O. Ktze, l. c. 318 (1891). *Chondrophora Howardii*, Britton, Mem. Torr. Club, v. 317 (1894). Similar to the last in habit, rather

smaller: leaves linear, firm: heads 5-flowered, the 12 to 15 bracts of the involucre oblong-lanceolate, somewhat arachnoid, the outer gradually, the inner abruptly cuspidate-acuminate: corolla-tube sparingly villous.

Parks of the Colorado Rocky Mountains; but included by Dr. Britton in the list of plants of the Gray's Manual region, I know not upon what grounds.

22. **C. Nevadensis.** *Linosyris Howardii*, var. *Nevadensis*, A. Gray, Proc. Am. Acad, vi. 541 (1865). *Bigelovia Nevadensis*, A. Gray, Syn. Fl. 136 (1884). Taller than the last, the head more elongated, and bracts more numerous, hirsute-ciliate, all with long slender firm but recurved tips.

Eastern slope of the Sierra Nevada in California, and adjacent Nevada.

23. **C. Bolanderi.** *Linosyris Bolanderi*, A. Gray, Proc. Am. Acad. vii. 354 (1868). *Bigelovia Bolanderi*, A. Gray, l. c. viii. 641 (1873). *Aster Bolanderi*, O. Ktze, l. c. 317. Low, somewhat viscid: leaves spatulate-linear, acute, not rigid: heads somewhat corymbose or racemose toward and at the ends of the erect branches, mostly subtended by one or more reduced leaves; involucre 7 to 11-flowered, the bracts few not in vertical ranks, lanceolate-acuminate, the inner very thin, the margins cobwebby-ciliate.

Same range as the preceding, though not closely allied to it, being much more analogous in several respects to *Macronema discoideum*, with which, as I have said before, it is much confused in the herbaria and by collectors. It were perhaps better to refer them to the same genus, *i. e.*, either this to *Macronema*, or that to *Chrysothamnus*. The line between these two genera must be drawn arbitrarily if at all; unless the present one be restricted to that series in which the corollas are shorter and more deeply-cleft, and the style-tips broader and shorter; that is, the series ending with our number 10.

24. **C. Bloomeri.** *Aplopappus Bloomeri*, A. Gray, Proc. Am. Acad. vi. 541 (1865). *Ericameria erecta*, Klatt, teste, A. Gray. *Aster Bloomeri*, O. Ktze, l. c. 317 (1891).

Nothing in the modern history of the asteroid composites was more arbitrary than the making the presence or absence of rays the dividing line between "*Aplopappus*" and "*Bigelovia;*" and the present plant is so intimately related to *C. Nevadensis* that I believe hybrids between them exist. This species is not to be referred to *Ericameria*, *i. e.*, the amplified *Chrysoma* of this series of papers, because it has neither the involucre nor the style-tips of that genus. Neither is it, as Gray described it, a glabrous shrub. It is very commonly found invested with the woolliness of the present group in some degree, at least when young; and the involucre, as well as the whole floral structure—long style-tips, claviform and merely toothed disk-corollas, etc.—is that of the present group, from which its few proper rays—1, 2 or rarely 3 or 4—can not in reason exclude it. In several particulars this and *C. albidus* are much alike.

Two South American shrubs or small trees, which Dr. Gray proposed to subordinate to his "*Bigelovia*," are clearly distinct from this *Chrysothamnus* series by having broad revolute-margined coriaceous leaves that are conspicuously veiny, the veins almost pinnately divergent from the conspicuous midrib; by their thinnish obtuse closely appressed and regularly imbricated involucral bracts; their deeply-cleft corollas with linear and spreading segments; their short and lanceolate style-appendages. To my view these are surely a genus, which may be called

NEOSYRIS.

1. **N. hypoleuca.** *Aplopappus hypoleucus*, Turcz. Bull. Mosc. (1851) 177. *Bigelovia hypoleuca*, A. Gray, Proc Am. Acad. viii. 638 (1873).

2. **N. fuliginea.** *Baccharis fuliginea*, HBK. Nov. Gen. et. Sp. iv. 68 (1820). *Bigelovia fuliginea*, A. Gray, l. c.

PLANTS HITHERTO UNDESCRIBED.—I.

By J. Burtt Davy.

Lupinus eximius. Frutescent, 2–3 ft. high, young branches, bracts, and growing parts hirsute with long soft white spreading hairs: stipules broad and semiamplexicaul, adnate for about half their length, those of the lower leaves for more, the free part subulate: leaflets 7–9, silky on both surfaces with longish pubescence, oblanceolate, obtuse, ending in a cusp, 8–10 lines long, 1¾—2¼ broad: inflorescence about 1½ in. broad, barely 1 inch in length when the lowest flowers open, but elongating to about 5 in.; bracts caducous 4-5 lines long, incurved and considerably exceeding the buds; pedicels stout, 3 lines long, pubescent; flowers light purplish-blue and white, wings and banner broad.

Plentiful on the highest ridge above Lake Pilarcitos, San Mateo Co., Calif., near the summit of the eastern slope, 20 April, 1895; my No. 1050. Type specimens preserved in the herbaria of the University of California and of Prof. Greene. A very handsome, free-flowering bush, noticeable for its large and delightfully scented flowers, the odor much as in *L. propinquus* and more delicate than in *L. arboreus*, in fact at once recalling the fragrance of a field of *Trifolium repens* in full bloom. The shortness of the inflorescence when the first flowers open is a marked feature.

Senecio Breweri. Perennial?, herbaceous, erect, about 2 ft. high with glabrous, sulcate stems: leaves apparently entirely glabrous; radical leaves tufted, rather long-petioled, lyrately pinnate with cuneate-obovate or subreniform, coarsely toothed leaflets, or deeply pinnatifid; upper cauline smaller, sessile and semiamplexicaul, laciniately 1–2–pinnatifid, the lobes toothed: inflorescence corymbose, peduncles and pedicels long; heads erect, 5–6 lines high, about 4 lines broad; bracteoles few and very short; involucral bracts ½–¾ or even 1 line broad, 10–15 in number, apparently thin and lightly 2-ribbed, their broadly scarious margins overlapping in flower; rays few, broad, light yellow.

Gravelly slopes and hills of Alameda Co. and southwards in California; common. Type Prof. Brewer's No. 512 collected on the Geological Survey of California, 1862, and preserved in the herbarium of the University of California. At once distinguished from *S. eurycephalus* with which it has been confused, by the more numerous heads and corymbose inflorescence, the cut and apparent glabrousness of the foliage, and the broad involucral bracts. The leaves of *S. eurycephalus* bear remnants of tomentum even when the plant is fruiting: the involucral bracts are about 20 in number, narrow, with a thick fleshy midrib leaving a narrow sub-scarious margin; in flower they cohere somewhat, separating irregularly in fruit. The range of the latter plant is more northerly than that of *S. Breweri* and it appears to prefer the neighborhood of streams.

Senecio caulanthifolius. Stems 2 or 3 from a perennial rootstock, erect, simple, about 2 ft. high, clothed when young with very short sparse wool: radical leaves with long slender petioles, narrowly cuneate-ovate obtuse, to lanceolate-elliptical acutish, coarsely and doubly crenate-serrate, roughish above with minute scurf; veinlets reticulate, flexuous: lower cauline leaves long-petioled, pinnatifid; upper smaller and more distant, sessile, semiamplexicaul, laciniate: inflorescence loosely corymbose; heads several; pedicels long; involucres 4 lines high, bracts about 15, broad, 2-ribbed, scarious margined, with few bracteoles, these about ½ their length; rays broad.

Murphy's Camp, Calaveras Co., Calif., May 24th, 1895; my No. 1437. Type specimens in the herbaria of the University of California and of Professor Greene. Readily distinguishable from *S. Breweri* by the foliage and much longer pedicels.

Triglochin concinna. Rootstock perennial, stoloniferous: leaves 4 or 5, 4–6 in. long, usually less than 1 line wide, linear, half-terete, flattened and slightly grooved on the inside, flattened on both sides at the apex: scape slender, wiry 8–13 in. high sometimes attaining 17 in., not densely flowered: stamens 6, in 2 series: fruits bluntly trigonous, not ribbed, 2–2½ lines long, 1½ line broad, ascending, on pedicels nearly the same length; coccæ 6, free, all fertile.

Abundant in the salt marshes around San Francisco Bay, Calif., together with *T. maritima*; my No. 1116. Type specimens in the herbaria of the University of California and of Professor Greene. In drying for the herbarium the coccæ are apt to become canaliculate on the back, and the shape of the fruit is entirely destroyed.

SPHÆRALCEA ANGUSTIFOLIA, G. Don, var. **violacea.** Size, aspect and general habit of Gray's var. *cuspidata*, but pubescence coarser and, on the stem, less abundant; bracteoles darker colored and much longer, in fact exceeding the buds, and in anthesis exceeding the calyx tube, corolla violet. My No. 36, collected at Painted Cave railroad station on the banks of the Rio Grande, Texas, March 12, 1893. Type specimen in the herbarium of the University of California.

NOVITATES OCCIDENTALES.—XV.

By EDWARD L. GREENE.

Delphinium leucophæum. Slender, erect, simple, 2 feet high, from a cluster of short and thick tuberiform roots; the whole plant puberulent, the stem retrorsely so: cauline leaves divided into 5 linear-cuneiform 3-cleft segments, all linear and callous-tipped: raceme rather long and loose, the pedicels all about an inch long or somewhat less: sepals rather small, oblong and obovate, yellowish white, the spur long, straight, ascending, acutish: lower petals conspicuously woolly-hairy, colored like the petals, the upper apparently dark blue or purple: follicles rather short, erect, puberulent: seeds small, elongated cubical, sharply angled.

Specimens in herb. Calif. Acad., said to have been collected somewhere in Oregon, by T. S. Brandegee.

Boisduvalia bipartita. Erect and simple, or with a few decumbent branches from the base, a foot high or somewhat less, the herbage pale and softly villous: leaves lanceolate and linear-lanceolate, or the floral ovate-lanceolate, all entire or obscurely and remotely denticulate: corolla white, each petal parted almost to the base into two unequal lobes, the smaller one about two-thirds the length of the other: capsule villous: seeds few and large.

Sandy dry bed of the Arroyo del Valle, Alameda Co., California, 14 June, 1895. A most remarkable species, on account of the regularly unequal lobes of the very deeply parted petals; the open corolla invariably appearing as if composed of eight petals, four long and four short.

Aster leucanthemifolius. Annual or biennial, stout, rigid, erect, a foot high or more, somewhat divaricately and quite loosely branching; herbage pale and appearing glaucous, but really cinereous-puberulent as seen under a lens: lowest leaves 2 inches long, spatulate-obovate, coarsely and deeply crenate-serrate, the teeth with a short rigid spinous appendage; cauline leaves similar but scattered and small, ½ to 1 inch long: heads small; involucre turbinate, the bracts with short herbaceous spinescent recurved tips: rays about 20, broad and short.

Southern Nevada, near Candelaria, at an elevation of 6000 ft., Shockley.

Aster inornatus. Apparently perennial, the several equal stems ascending, from a central tap-root and attaining the height of 2 or 3 feet; herbage pale, obscurely puberulent: leaves few, narrowly oblanceolate, remotely and slightly serrate-toothed, the cauline much reduced: heads short-peduncled or subsessile on the upper part of the stem and along the few short virgate branches: involucre turbinate, 5 lines high; bracts very numerous, not spinescent but abruptly squarrose at tip, and with sessile glands along the edges: rays none: teeth of disk-corollas pubescent: pappus almost barbellulate.

Plentiful on the plains of Shasta River, Siskiyou Co., Calif., apparently collected only by the present writer, in 1876. Both this and the preceding are of the *Machæranthera* subgenus.

Linanthus serrulatus. Freely and almost diffusely branching, 6 or 8 inches high, green and seemingly glabrous but the branches pubescent: leaf-segments and floral bracts all linear-acerose, glabrous, but the margins spinulose-serrate; calyx-segments more than twice the length of the tube, remotely serrate-ciliolate: corolla with slender dark-purple not far exserted tube, and narrowly funnelform throat, the limb of oblong-spatulate white segments expanding to the diameter of ¾ inch.

Near Madera, California, 1889, Mr. Buckminster.

Linanthus montanus. *L. ciliatus*, var. *montanus*, Greene, Pitt. ii. 260. Habit of *L. ciliatus* but larger, less hispid: corolla many times larger, nearly 2 inches long, with elongated tube gradually widening to a broadly funnelform purple throat, the limb of cuneate-obovate truncate whitish segments ½ inch broad, yet apparently expanding not to the rotate, but only to the wide-funnelform.

Common at middle altitudes of the Sierra Nevada from Nevada Co., southward to the San Bernardino Mountains, from which southern station Mr. Parish has distributed it for *L. androsaceus*, to which it is not intimately related.

Linanthus nudatus. Slender, 3 to 10 inches high, with few and divergent branches; lower internodes not exceeding the short (¼ inch long) leaves, the upper 1½ to 3 inches long or more: branches puberulent: ordinary leaf-segments hispidulous-ciliate, the floral villous-ciliate: calyx scarious between the angles, the segments hirsute-ciliate: corolla with very slender long-exserted tube, short yellow throat, and white or purplish limb ½ inch broad.

Probably common in Lake County, California. Well marked by its short foliage, long naked internodes and dense clusters of small flowers.

Linanthus luteolus. Very diffusely branching, 3 to 6 inches high, rather roughly hirsute-pubescent throughout, the leaves and leaf-like organs all destitute of any special marginal ciliation: mature calyx 5-parted almost to the base, perhaps when young less deeply cleft and with narrow scarious spaces below the sinuses: corolla yellow, with very slender tube, no throat, and a rotate limb about ⅓ inch broad.

Cuyamaca Mountains in southern California, G. R. Vasey, June, 1880, and in Lower California, Mr. Orcutt, 1889.

All the foregoing new *Linanthus* species are of the *Leptosiphon* subgenus.

Sisyrinchium sarmentosum, Suksdorf in herb. Stem and leaves very slender, apparently ascending, 6 to 10 inches high: spathes very unequal, far exceeding the few pedicels: ovary and perianth delicately puberulent, the latter light blue, small, the segments all abruptly but slenderly acuminate: seeds very small, broadly pyriform, delicately but very regularly sinuate-rugose.

Borders of wet meadows in Skamania Co., Washington, at altitudes of 2,000 or 3,000 feet, August, distributed by Mr. Suksdorf under the above name, the fitness of which does not appear from the specimens, though the stems are said to be "sometimes rooting at the nodes." The species is an excellent one; the segments of the perianth not being in any degree notched at the apex, or even truncated, but simply acuminate.

SUNDRY PROPOSITIONS,

Commended to the consideration of the most northwesterly editor of the Botanical Gazette.

WHEN an editor prefaces his contributor's paragraphs with words of sympathizing commendation, he is naturally ready to defend the matter thus contributed.

THE words Latin and latinity are, in the last *Gazette*, assumed to be synonymous. Before printing this, our editorial friend should have instructed himself on the important point, that dictionaries of Latin and of latinity are books of widely different scope and character.

LATINITY is Latin plus many other things, including whatever rubbish of barbarian and mongrel verbal jugglery and clap-trap with Latin endings of *us*, *a*, *um*, etc., those innocent of grammar have fabricated and left on written record in ancient, or mediæval, or modern times.

WHEN there is question of such names as *elatiocarpus* or *versicolorcarpus*, of course a *Lexicon of Latinity*, and even of *All Latinity* must needs come into requisition. No Lexicon of Latin would serve but to condemn. *Latin* never knew, nor can ever know such terms.

QUERY. Will not old friends of the *Gazette* hide in deep humiliation confused faces, as they read on a page of this valued journal such brazen statements as that *brevifolia* and *breviflora* are mongrel terms, half Greek and half Latin, and that *cuspidocarpus* and *lanocarpus* are Latin legitimate and pure?

QUERY. When our two friends of the northwest, the Editor and the Astragalologer, combine their grammatic and literary skill in efforts to make another man appear given to hasty and unseemly speech in criticism, do not their sentences recall with delightful freshness, the homely half-forgotten fable of the pot that called the kettle black?

E. L. G.

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ERYTHEA

A JOURNAL OF BOTANY, WEST AMERICAN AND GENERAL.

EDITED BY

WILLIS LINN JEPSON

AND OTHERS, OF THE DEPARTMENT OF BOTANY,
UNIVERSITY OF CALIFORNIA.

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ERYTHEA

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NOTES ON THE GENUS NEMOPHILA.

By F. T. Bioletti.

Among the most noticeable of Californian annuals are the showy Nemophilas of the Menziesii group. About half a dozen species have been described by various authors, namely, Douglas, Bentham, Hooker and Arnott, Fischer and Meyer. These in Gray's Flora of North America were reduced to two, *Nemophila insignis*, Dougl., and *N. Menziesii*, H. & A. *N. pedunculata*, Benth., a species which properly belongs to this group, although the flowers are minute, has been recognised by Prof. Greene in the "Manual of the Botany of the Bay Region." Most of the species originally described were known to their authors in the fresh state, while the uniting of species has been done principally by those who have studied the plants as dried specimens.

The characters which have been chiefly used in the differentiation of species in this group, such as the size and pubescence of the plant, the form of the leaves, the color and markings of the corolla are extremely variable. Plants unquestionably of the same species from different localities, and even plants growing side by side, show great diversity in leaf outline and pubescence. The calyx and ovary present some good characters but the calyx appendages vary greatly in size and shape, being occasionally completely absent. The small flowered Nemophila (*N. pedunculata*, Benth. ?) growing on the San Francisco sand hills is often without calyx appendages and I have found *N. atomaria* with only one or two, the others not having developed. As Bentham first pointed out, the inter-staminal scales, or appendages, of the corolla are fairly constant in form in the same species. In the present grouping of the species the form of these scales has alone been considered of primary, and the vegetative characters of only secondary specific value. The corolla appendages are ten in number and occur in pairs at the base of each filament. Fischer and Meyer, in their

Erythea, Vol. III., No. 10 [1 October, 1895].

excellent paper on this genus, distinguish three kinds of corolla appendages: (*a*) scales with free tips; (*b*) scales adnate their whole length; and (*c*) hairy lines. Of the three species described in this paper, two have appendages of the first kind, with distinctly free tips. The other species has very narrow and very hairy scales and was probably included by Fischer and Meyer in the last class.

Either of the original descriptions of *Nemophila Menziesii* and of *N. insignis* would apply equally well to either of our two common large, blue Nemophilas. Hooker and Arnott who considered *N. insignis* a variety of *N. Menziesii* note no difference but the relative size of corolla and calyx. Now the form with reduced or abortive anthers has almost constantly flowers of about half the size of those of the perfect form. Is it not possible that Hooker and Arnott had these two forms before them when they united the species? However this may be, the descriptions proper are practically identical and can, therefore, be applied but to one plant. In a note Hooker and Arnott state that the leaves of *N. Menziesii* are exactly those of *N. parviflora*, which if constantly true, would exclude the name from use for either of the two plants to which it has been applied in recent works. It seems impossible to determine which plant received the name of *N. Menziesii* on account of the meagreness of the description. The type specimen is of little use, as Prof. Greene, who has lately seen it, states that it is without flowers and, therefore, impossible of determination. *N. insignis*, on the contrary, was figured in the Botanical Register in 1834, undoubtedly from the same plants from which Bentham drew up his description. From this there can be little doubt to which species this name was applied, though the form of the corolla scales is not very clearly brought out. A somewhat incomplete specimen of a large, blue-flowered Nemophila collected by Mr. Burtt Davy on Loma Prieta has leaves very closely resembling those of what seems to be the type of *N. parviflora*. The flowers are very hairy at the base of the corolla and apparently without scales.

This may be the original *N. Menziesii*, but more complete material would be necessary before hazarding an opinion. All that at present seems certain regarding the name *N. Menziesii* is that it was applied to some member of this group and that it was the first so applied. The original description covers very well the whole group and this taken in conjunction with the close resemblance of the different members seems to render it advisable to use the name *N. Menziesii*, H. & A., to designate the whole group and to consider the divisions of the group as sub-species. We can thus apply the names *N. insignis*, Dougl., and *N. atomaria*, F. &. M., to the plants which originally received those names. The common plant of the counties north of the Bay has never been properly segregated and is thus left without a name, a lack which I have supplied below.

N. intermedia. From 6 to 12 inches long, with ascending branches from the base, more or less hairy, leaves pinnately parted into 5 to 9 entire, or 2- to 5-lobed, divisions, petioles somewhat widened at the base and ciliate, the upper all opposite; corolla .75 to 1 inch wide, bright blue to white, distinctly blue-veined, more or less punctate with dull purple dots; inter-staminal scales extending nearly to the sinuses, long, narrow, hairy and with expanded tips; ovary rounded, ovules 12 to 24.

This plant is included with several others under the name of *N. Menziesii*, H. & A., by Gray in the Flora of North America, ii, 156; it is part of *N. insignis* as defined in the "Botany of the Bay Region." Living plants have been examined from the counties of San Francisco, Marin, Sonoma, Lake, Alameda and Contra Costa. The range of this plant is more northerly and westerly than that of *N. insignis* which prefers hot localities and especially sandy soils.

N. INSIGNIS, Dougl. In habit very like the above but less succulent and generally more hairy, leaves somewhat more divided; calyx with broader ovate-lanceolate divisions and shorter and broader appendages, shining and distinctly veined; corolla one inch or more broad or the imperfect flowers half that size, from light to deep purplish blue, not distinctly blue-veined, the circular white center more or less punctate; inter-staminal scales short, wide and short hairy; ovary longer than in *N. intermedia* and with 20 to 32 ovules, Benth. Linn. Trans. XVII, 275, (1833) and Trans. Hort. Soc. I, 479; Gray, Flora of N. A. I, 155; Greene, Bot. Bay Region 252 in part. *N. Menziesii*, var., H. & A. Bot. Beech. 372.

Living plants of this species have been examined from the counties of San Francisco, Alameda (cultivated), Contra Costa, Amador, Tulare and Los Angeles.

N. ATOMARIA, F. & M. With the habit of *N. intermedia* but less hairy and growing only in springy places among the hills; corolla less than one inch wide, white with a slight tinge of violet on the outside of the tube, closely dark-spotted nearly to the edge, densely hairy within the tube; inter-staminal scales narrow and long-hairy; ovary rounded and less hairy than that of the two foregoing species, ovules about 16. Ind. Sem. Hort. Petrop. (1835). Bot. Reg. t. 1940

The figure of the scale is drawn from a plant from Cazadero, Sonoma Co.

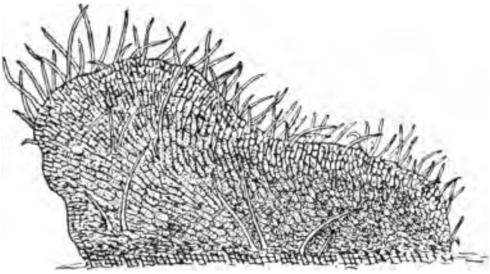
The color of the flowers is variable in the first two species, but *N. insignis* is generally more deeply colored, of a less pure blue and with a white center of more distinct circular outline. The spots are very variable in both species. At Lake Merced, San Francisco and at Pomona the corolla of *N. insignis* is almost destitute of spots, while specimens of the same species from Tulare are more densely spotted than any specimens of *N. intermedia* that I have seen; but in neither species do the spots extend to near the edge of the corolla as in *N. atomaria*.

EXPLANATION OF PLATE.

I. Nemophila insignis, Douglas, corolla scale.
II. Nemophila intermedia, Bioletti, corolla scale.
III. Nemophila atomaria, F. & M., corolla scale.

Each of the figures is magnified twenty diameters.

Plate 2.



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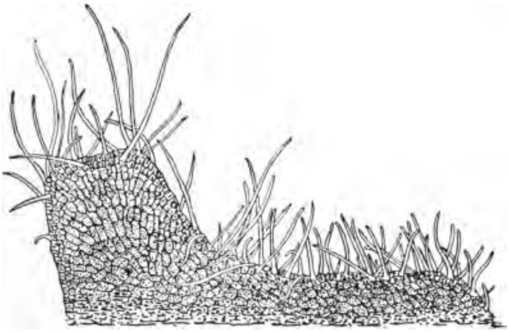

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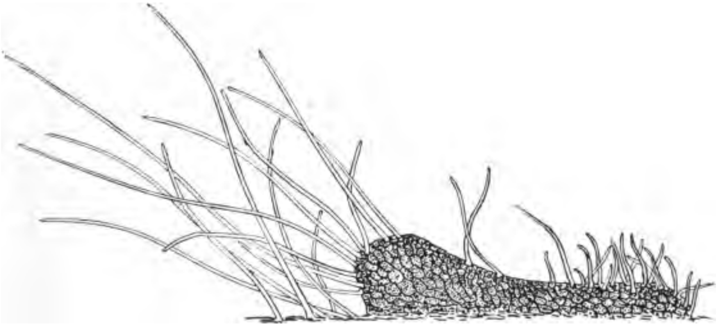

III

Corolla Scales of Nemophila.

PACIFIC SLOPE PLANTS IN ENGLISH GARDENS.

By J. Burtt Davy.

The Englishman's delight in his garden is proverbial. As with other things, this hobby of his is subject to the vicissitudes of fashion, both as regards the nature of the plants or the particular order or genus which receives his special attention, and as regards the method of laying out of the ground and the grouping of its occupants.

Within the last few years a re-action has been observed in English gardens against the stiffness and formality incident to "carpet-bedding" and "color-massing," and a desire has been manifest to produce as much diversity of form and coloring in a small space, as good effect would permit. This has resulted in the revival of the more natural and by no means new arrangements known as the "herbaceous-border," and the "rock-garden." The former is frequently met with in the form of a long flower-bed under a wall, or dividing a lawn or gravel walk from a live-hedge or shrubbery, having tall and showy herbaceous plants, such as Dahlias, Asters, Chrysanthemums, etc., for a background with shorter plants in front, and a border composed of *Lobelia Erinus* or some other dwarf species: the individual plants are relatively placed so that a succession of flowers is produced all through the season, no one part being entirely without blossoms or ornamental foliage at any time. The rock-garden is the result of an attempt to reproduce the conditions best adapted to the growth of Alpine plants and ferns, a bog-garden being often combined with the rockery.

In order to provide material for, and to maintain an interest in, these two forms of garden—usually met with in the same grounds—it is necessary for the nurseryman to go to more trouble and expense than he would to simply procure new forms, or variations in size and color, of one favorite species such as the ordinary garden Rose, the Pansy or the Chrysanthemum, for instance. He must provide "new garden plants," *i. e.* species which have never hitherto been under cultivation or if once grown have since been lost to horticulture, in order to meet the demand for variety and novelty. For herbaceous-border work these plants should come from regions within the temperate zone, or if from the tropics then from comparatively high altitudes; his choice of locality is therefore restricted. Among countries affording the necessary qualifications California is one of the richest fields for the collector, the remarkable variations in climate, soil and altitude found within the borders of the State producing a very great variety in its flora. Earlier in the century, when Englishmen were willing to pay more for rare plants than now, and nurserymen were therefore able to send collectors to all parts of the habitable globe, California yielded no small proportion of the plants newly introduced to a flower-loving public. Latterly, little has been done in this line, but within the last year or two the interest in bulb culture and in the "mixed flower-border," has resulted in the introduction of several West-American novelties, mainly through the efforts of resident collectors. The bulb catalogue of a London (England) firm of nurserymen, lately issued, offers among other things the following Pacific-coast plants:—

Bloomeria aurea, *Brodiæa coccinea*, *B. congesta*, *B. grandiflora*, *B. Hendersoni*, *B. Howellii* and *B. volubilis*, *Calliprora flava*, *Calochortus amœnus*, *C. Kennedyi*, *C. luteus*, *C. Lyoni*, *C. pulchellus*, *C. splendens*, *C. venustus*, *C. v. citrinus*, *C. v. purpureus*, *C. v. roseus* and *C. v. Vesta*, *Camassia esculenta*, *C. Fraseri* and *C. Leichtlini*, *Erythronium giganteum*, *E. grandiflorum* and *E. Hendersoni*, *Fritillaria lanceolata* and *F. pudica*, *Milla laxa*, and *M. biflora*.

The prices at which these are offered in London are an interesting item: the following are some of the quotations:—

Brodiæa grandiflora 7/6 per 100 or 1/3 per doz.; *B. coccinea*, *Calochortus luteus*, and others 4/6 per doz. or 6d. each; *Calochortus amœnus*, *C. venustus Vesta*, *Camassia Fraseri*, *Erythronium Hartwegi*, and others 7/6 per doz.

or 9d. each; *Brodiœa Hendersoni*, *B. Howellii* and *B. volubilis* 1/ each; *Calochortus Lyoni* 1/6 each; *C. Kennedyi* 1/9 each; and *Camassia Leichtlini* 3/6 each.

The love of flower-culture has directly benefited the botanist in more than one way. To it, entirely, may be attributed the sending out of James Bowie, Allan Cunningham, David Douglas, and other collectors, on those expeditions which did so much to advance systematic botany. It has further resulted in the publication of plant-portraits such as those of the *Botanical Magazine*, *Botanical Register*, *Gardeners' Chronicle*, and *Gartenflora*, which have been of such service in the accurate delimitation of types. It will be of interest to West-American botanists to see that *Lilium Parryi* has recently been figured in the *Gardeners' Chronicle*, (Aug. 24th; 3 ser., xviii, 209) the drawing having been made from a specimen recently flowered, for the first time (?), under cultivation in England, and exhibited as a novelty at a meeting of the Royal Horticultural Society by Messrs. Wallace, Nurserymen, of Colchester. The figure is accompanied by the following extract from Dr. Parry's account of the plant as given by Elwes in his *Monograph of the genus Lilium* (1880):—

"In one of my last botanical excursions in the vicinity of San Bernardino in July, 1876, I accepted an oft-repeated invitation to visit the intelligent brothers J. F. and F. M. Ring in their mountain retreat near San Gorgonio Pass. Leaving the broad and picturesque basin of the Santa Ana Valley near the emergence of the stream from the rugged mountain-wall of the San Bernardino range, our route, after crossing Mill Creek, hugged the foothills bordering the Upper Yucaipa Valley; thence by a more rapid ascent in a nearly direct easterly course, we reached an elevated bench scattered with Pine and Oak groves, overlooking the broad sweep of the San Gorgonio Pass, now traversed by the eastern extension of the South Pacific Railroad. In one of these mountain nooks the Messrs. Ring have located a potato ranch, the elevation of over 4000 feet giving a sufficiently cool, moist climate, while the adjoining mountain-slopes afford an extensive summer cattle-range long after the herbage of the lowlands has dried up.

In scattered groves of *Pinus Coulteri*, the ground was strewn with the massive cones of this peculiar species, its dense scales armed with formidable hooked spines. Many of the cones were fully 6 inches in diameter, with a length of 9 inches.

The few perennial watercourses here met with are mostly confined within deep and inaccessible ravines; but more frequently scanty springs ooze out from beneath deep layers of porous strata, and spread out into boggy marshes, generally choked up with rank Willow and Alder growths, and occasionally expand into small meadows of coarse grass and sedges.

On all the steep gravelly slopes adjoining, there was the usual display of Californian evergreen shrubbery, including the Heath-like *Adenostoma* (which under the name of 'chamisal,' is largely used for fuel), the Holly-leaved Cherry (*Prunus ilicifolia*) exhaling a strong odor of bitter almonds, the *Heteromeles arbutifolia*, with glossy varnished leaves, and a prevalent form of 'California Lilac' (*Ceanothus crassifolius*), with thick leathery foliage. The dull green hue which everywhere characterises the moorish growth, is at this time of the year partly relieved by brilliant scarlet festoons of *Pentstemon cordifolius* trailing over adjoining bushes, or the less showy blossoms of *P. ternatus*.

But what soon attracted more exclusive attention was a conspicuous yellow Lily growing abundantly on the boggy ground adjoining Messrs. Rings' house, and sharing with the potato-patch the care and attention of the undisputed possessors of the soil. Though not so showy as some other members of the Lily family in this region, there is a grace displayed in its large drooping flowers, surmounting a slender stem beset with narrow scattered leaves, which are occasionally crowded at the base into a distinct whorl."

There remain many remarkable and handsome novelties indigenous to the Pacific Slope, which would greatly enrich the herbaceous-border, rock-garden or temperate-house of European lovers of plants, and which only await the foresight and capital of enterprising nurserymen to be made available. Travelling is still very expensive in this region (3 cents a mile and upwards, by railroad) and the area included in the coast States very great, much greater evidently, than Europeans and even dwellers in the eastern States realize; nevertheless the rapid increase of population and consequent increase in facilities for travel renders the work of exploration, collection and transport comparatively easy, and far less costly than in many other countries, especially if resident collectors, well acquainted with western life, are employed. While annuals form a large proportion of the showy spring flowers of the coast plains, there is also a rich abundance of perennial species.

OPEN LETTERS.

The following letter is in answer to an inquiry respecting the folk-name "gietta grass" and the identification of the plant to which it is applied.

San Bernardino, California, Sept. 15, 1895.

Your favor inquiring about the desert grass called *gietta grass* is received. The name as given in *Bot. Calif.* (ii. 293) is *Pleuraphis rigida,* but later it has been named by Haeckel *Hilaria rigida.* It is true desert grass, never growing elsewhere. It is excellent fodder, not only "mules" but horses and cattle preferring it to any other wild or cultivated plant, I believe. It is the grass often spoken of by desert men as being "cut with a hoe," as it is so woody (apparently) and brittle that a hoe is the ordinary tool used in gathering it. Teams coming in from the desert often have a bundle of it on their wagon, as a precautionary provision for the animals. The orthography of the word, [gietta], is various; I judge it to be an Indian word, a true "native word" as well as being a native plant; it is sounded as if spelled gy-i-ett'-a, almost in four syllables,—(g = hard, i = short e), though the i is very short and slurred over, approaching gy-ett'a.

The only other desert grass of eminent value for forage is the "grama grass", *Bouteloua* spp. of *Bot. Calif.*, which grows in similar places,—both grasses growing abundantly in their own chosen localities, but always thoroughly desert.

It has been some years since I have collected many desert plants and I am not certain whether I have any specimens or not, of either, as my plants are boxed and stored; but if you need any, I can probably get them, perhaps from Mr.—, if not from my boxes.

Yours truly,
W. G. WRIGHT.

MISS ALICE EASTWOOD,
California Academy of Sciences.

MISCELLANEOUS NOTES AND NEWS.

THE vacancy in the professorship of botany in the University of California has been filled by the election thereto of Dr. W. A. Setchell, Instructor in Botany in the Sheffield Scientific School, Yale University. He graduated from Yale in 1887 where he was a student of Eaton and continued his work as a graduate student under Dr. Farlow at Harvard where he received his doctor's degree in 1891. Professor Setchell is largely interested in the marine algae. As a result of his work in this field he has contributed to the Proceedings of the American Academy of Arts and Sciences two articles: "Concerning the Structure and Development of Tuomeya fluviatilis, Harv." (xxv., 53, May, 1890) and "Concerning the Life-History of Saccorhiza dermatodea, (De la Pyl.) J. Ag." (xxvi, 177, September, 1891). These articles were accompanied by plates illustrating gross and minute structure. A paper entitled "On the Classification and Geographical Distribution of the Laminariaceae," may be found in the Transactions of the Connecticut Academy, (ix., 333, 1893). These papers will give an idea of the character and purpose of the research work of the new head of the Department of Botany at California. We believe they represent thus far the totality of his published contributions to the knowledge of the marine algae. In the Botanical Gazette for May, 1894, appeared "Notes on the Ustilagineae." Professor Setchell there describes a new species of Doassansia, viz. *D. intermedia* and, also, describes and figures the germination of several other species. One of his latest papers is a biographical sketch of Professor Eaton. This was published in the Bulletin of the Torrey Club for August, 1895. The summer botanical work at Woods Holl, it may be noted, is under his direction. It is hardly necessary to say that Professor Setchell is versed in modern laboratory methods. He has the reputation of being a careful and thorough worker and possesses the very large advantage of being a young man.

DR MAXWELL T. MASTERS, has renamed the Guadeloupe Island Cypress as *Cupressus macrocarpa* var. *guadeloupensis*, in the *Gardeners' Chronicle* for July 20 (3 ser., xviii. 62). In connection with this change he remarks:— "The late Prof. Sereno Watson described, (Proc. Am. Acad. xiv. 300, 1879), this fine Cypress as a distinct species, under the name of *C. guadeloupensis*, and perhaps rightly. It may also, and, as we think, more correctly, be considered as a form of *C. macrocarpa*. The latter, known as the Monterey Cypress, has a very limited range of distribution on the Californian coast, and, to our thinking, the present is but an insular variety of the species, differing from the type more especially in its glaucous color. It is true there is a considerable distance between Monterey in lat. 36° 4′, and

Guadeloupe, an island in 29° N. L., 200 miles from the mainland, with deep sea all around, but it is possible that intermediate localities may be found. At any rate, the presence of distinct characters is a common feature of plants growing on isolated islands, * * *."

In his *Handbook of West-American Cone Bearers*, (July, 1895) Mr. Lemmon gives as an additional locality for this tree, "Coast of San Diego County, California."

Dr. Masters' article is accompanied by a figure of *Cupressus macrocarpa* var. *guadeloupensis* with foliage and male flowers magnified, cones rather reduced, and, for sake of comparison, a figure of *C. Arizonica*, Greene, with a transverse section of the leaves of that species, and also of those of *C. macrocarpa*, Hartweg. J. B. D.

THE SUM of $250,000 has been subscibed for the proposed New York Botanic Garden. A number of wealthy citizens have each subscribed $25,000 and others lesser amounts. The sum so obtained, and as much more as can be secured, is designed solely for an endowment. The city of New York is expected to provide two hundred and fifty acres of land and a half-million dollars for buildings. The plans of this botanical establishment as outlined contemplates that provision will be made for nearly all lines of botanical work. The success of the undertaking thus far is largely due to Dr. N. L. Britton.

VOL. III. NOVEMBER, 1895. NO. 11.

ERYTHEA

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EDITED BY

WILLIS LINN JEPSON

AND OTHERS, OF THE DEPARTMENT OF BOTANY,
UNIVERSITY OF CALIFORNIA.

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University of California.

OBSERVATIONS ON THE HABITS OF NEMOPHILA.

By Alice Eastwood.

The Nemophilæ comprised provisionally under the name of *Nemophila Menziesii* in a previous article[1] are undoubtedly adapted for pollination through the agency of insects. The lines and dots of the petals, the honey glands and protective hairs, and, above all, the arrangement of the essential organs indicate it plainly. In *Nemophila insignis* and *intermedia* (?) there are two distinct kinds of plants, those with pistillate flowers only and those whose flowers are all hermaphrodite. This may also be the case in *N. atomaria;* but so far all plants seen have only hermaphrodite flowers.

The hermaphrodite flowers of the group are proterandrous. Soon after the flower expands the stamens begin to discharge their pollen; the stigmas are immature and non-receptive and the two branches of the style are almost side by side as shown in figures A and C, the papillae on the surface of the stigma being undeveloped though perceptible. The stamens are extrorse and discharge the pollen among the hairs of the corolla appendages and of the ovary. The honey glands are quite large and are protected by the surrounding hairs.

As the anthers grow old, shrivel and lose their pollen, the branches of the style begin to spread apart and grow longer, even curving downwards as if to reach the insects seeking the honey below at the base of the ovary; the stigmas become bulbous and the papillae which were smooth and round develope almost into tubercles. Figures C and D show the difference between the mature and immature stigmas.

In the pistillate flower (fig. B) the opening corolla shows quite a different condition. The stamens are, of course, sterile, mere ghosts of stamens with the outlines of filaments and anthers but without that which gives the anthers life. The pistil, however, is conspicuous, the branches of the style fully

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[1] Supra p. 139.

expanded and the stigmas receptive from the first. Figs. E and F show the relative size of the fertile and sterile anthers. The honey glands of the pistillate flowers are somewhat larger than those of the hermaphrodite flowers and the corollas are usually smaller. Wherever a patch of *Nemophila insignis* is seen the female plants can be easily distinguished by a more robust habit of growth and smaller deep blue flowers. The plants with perfect flowers are more abundant and with their more showy corollas almost banish their specialized companions into obscurity.

An investigation of many plants of *Nemophila insignis* collected when the first fruits were ripe and flowers still present did not show, as expected, that the fruits of the pistillate flowers contained more or larger seeds or indeed any structural superiority. If there is any, the evidence is in favor of the hermaphrodite flowers. An unlooked-for, but easily explained difference, however, became evident. It was found that the pistillate flowers ripened fruit earlier.

The reason of this will be understood when it is remembered that the pistillate flowers have receptive stigmas from the first and so get the start of the hermaphrodite flowers. This habit of the plant may have arisen from the necessity for ripening the fruit before the dry season. Nemophila is one of the earliest annuals and without qualities for resisting drought. It comes up early in the spring, flourishes awhile in great profusion and, except in some favored spots, is entirely gone before the hills turn brown.

The following table shows the results of the examination of the fruits. Besides the hermaphrodite flowers in the table, a great many were examined that had fruit too young to be sure of the number of seeds. Of these I kept no account. Very few plants with pistillate flowers were found that had not some pods with well formed seeds. Each group of figures enclosed in parentheses represents the number of seeds found in the almost ripe capsules of a single plant, each figure representing a single capsule.

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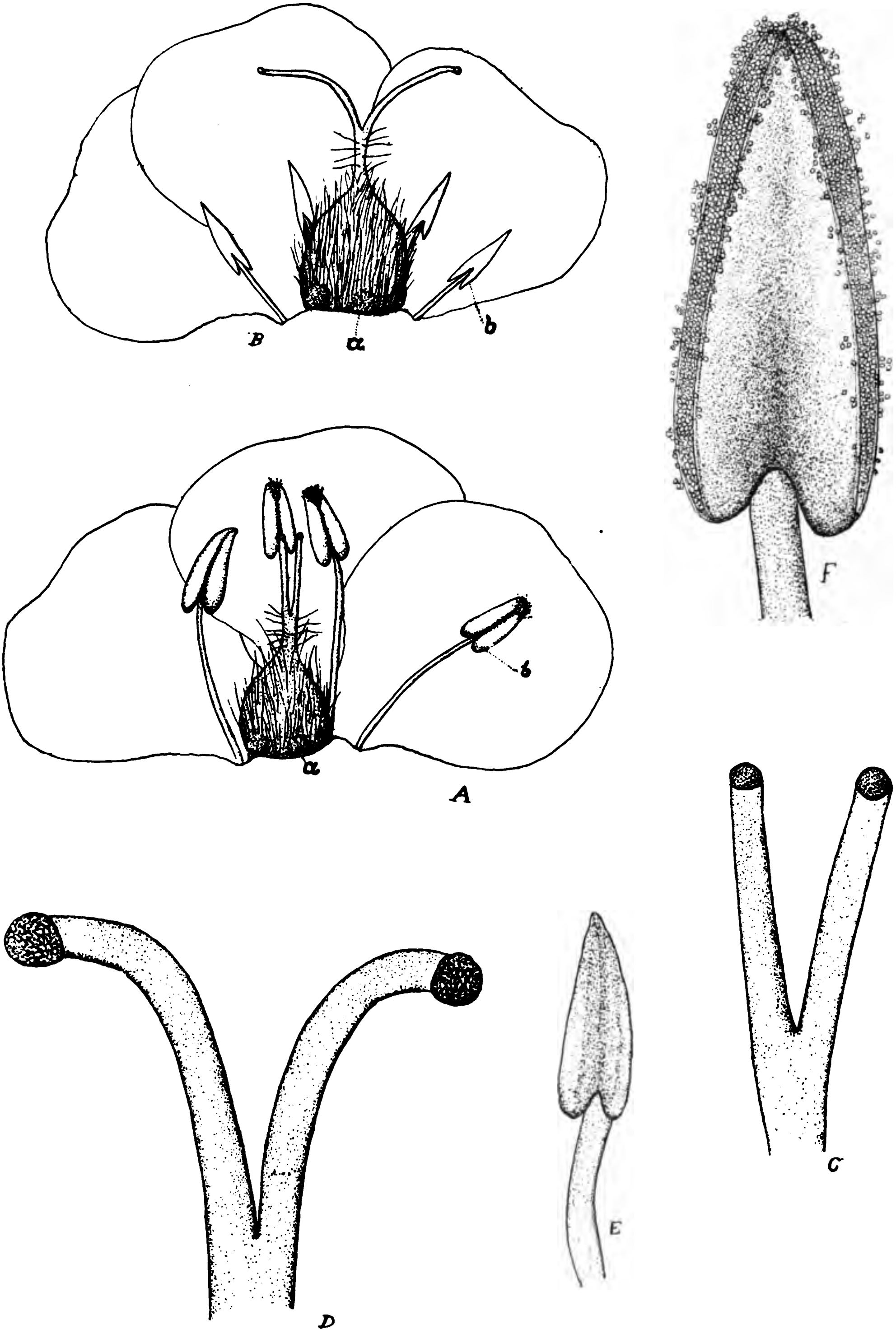

NEMOPHILA INSIGNIS, Dougl.

PLANTS WITH HERMAPHRODITE FLOWERS.

(14, 8) (16) (12, 13, 8, 9, 10) (9, 11, 15) (20, 18, 18, 16, 19) (14, 6, 8, 6) (16, 12) (20, 23, 26) (18, 19) (14, 25, 19, 23, 14) (18, 17) (8) (7) (6)

PLANTS WITH PISTILLATE FLOWERS.

(13, 14) (10, 9, 6, 10) (19, 16, 13, 22) (14, 13, 21, 16) (8, 7, 11) (3, 4) (8, 6, 5, 6, 3) (7, 9, 9) (9) (7, 9, 8) (3) (10, 6) (13, 5, 9, 11, 12) (13, 8, 10) (15, 16) (22, 20, 19, 17, 16, 17) (14, 18, 20)

These tables are interesting as showing the variable number of seeds ripening, and also that the two kinds of plants are equally variable in this respect.

EXPLANATION OF PLATE.

A. Perfect flower; *a*, honey gland; *b*, anther discharging pollen.

B. Pistillate flower; *a*, honey gland; *b*, anther discharging pollen.

C. Immature stigma.

D. Receptive stigma.

E. Sterile stamen.

F. Fertile anther.

BOTANICAL EXCURSION TO ANTELOPE VALLEY.

By Dr. A. Davidson.

On the first day of May my companion and I arrived at Lancaster, Los Angeles Co., on a botanical excursion, and early the following morning took our seats in the mail stage for Gorman Station, fifty miles westwards. The district traversed, commonly known as the Antelope Valley, is practically an immense, level, triangular plain bounded by the Tehachapai Mountains on the north and the Sierra

Madre on the south, and at the point of junction is Gorman, a few miles on this side of the summit of the pass that lies within thirty miles of Bakersfield. The soil immediately surrounding Lancaster, and for twenty miles west thereof, is little cultivated, but beyond that point the valley, in almost its whole extent, may be considered as land fertile and fruitful.

About midway on this journey is the Colony of Manzana where about three thousand acres of the land bordering the southern foothills is occupied by neatly cultivated and thriving orchards of almond trees. The remainder of the valley where cultivated is sown with wheat. This year, doubtless owing to the opportune rains of winter, the wild plants all over this section have not only been more abundant than I have ever seen them but the colored species are of a deeper, richer tint. The mind may picture, to some extent, perhaps, the gorgeous effects produced by the acres on acres of wheat fields and hillsides aglow with Eschscholtzias, their petals of burnished gold and crimson reflecting the rays of the noon-day sun, while here and there large and deep blue patches of *Salvia carduacea* and the purple of *Orthocarpus purpurascens* amidst the golden Eschscholtzia heightens the beauty of the scene. *Amsinckia spectabilis*, F. & M., known here by the rather appropriate name of "Woolly Breeches," is very abundant, and in the uncultivated or neglected fields it seems for a season or two, with *Tropidocarpum scabriusculum*, Hook., to monopolize the soil.

As we continued our journey, the valley gradually narrowed until the terminus was reached at Gorman, where it is but a narrow pass. There we arrived at six o'clock and made our quarters in the old hostelry. The next morning the stiff breeze of the day before had increased to a gale, so we turned our faces to the southern hills, and explored the sheltered valleys on that side.

As the object of this paper is to list the various plants of this district that are mostly unrecorded for the county, I shall omit all reference to the commoner species. The first plant gathered, and of which we had seen specimens on the way, was *Collinsia Davidsonii*, Parish. It seems to be abundant all along the foothills from Lancaster. The type specimens from the latter place possessed a smooth calyx, while some of those here, and near Manzana, were more or less hirsute, nevertheless, it proves to be a good species. The beautifully colored *Astragalus Purshii*, Dougl., was abundant, growing with *Senecio multilobatus*, T. & G.; the latter, common enough on the coast hills at an altitude of four thousand feet, I have not found further east on this range, although it extends inland on the northern mountains as far as Tehachapai. A few plants, the only ones seen, of *Balsamorrhiza deltoidea*, Nutt., were noticed among the scrub oak, and *Ribes leptanthum*, Gray, *Phacelia ciliata*, Benth., *Streptanthus acutirostris*, and *Galium Andrewsii*, Gray, were all in flower. In a sheltered nook my first specimen of *Bromus carinatus*, Hook., was gathered, and on the margin of the marsh, near the station, appeared *Microseris montana*, Greene, and a variety of *Vicia Americana* with hirsute leaves.

In the afternoon we climbed the steep slopes of the hills on the northern side of the pass, which, on account of the trespassing sheep, were nearly devoid of underbrush but copiously covered with *Lupinus formosus*, var. *Bridgesii*, Greene, *L. Chamissonis*, Esch., var. *longifolius*, Wats., *L. micranthus*, Dougl., *Layia heterotricha*, H. & A., *Gilia tenuiflora*, Benth., and, more sparingly, *G. inconspicua*, Dougl., var. *sinuata*, Gray. In the shade of some live oaks *Ellisia membranacea*, Benth., was abundant. On the rocky ground grew *Streptanthus heterophyllus*, Nutt., *Œnothera gauræflora*, T. & G., and a few plants of *Astragalus Antiselli*, Gray.

On the next day we took the stage back to Manzana, collecting on the way *Madia elegans*, Don, *Troximon heterophyllum*, Greene, *Malacothrix Coulteri*, Gray, and *Mirabilis multiflora*, Gray, var. *pubescens*, Wats., the last not yet in flower. For the next three days we made Manzana our headquarters in order to explore the hilly district adjoining.

About three miles from Manzana is a small sheet of water, Lake Catrina, the road to which is well defined and botanically very interesting. As we entered the foothills the first shrub encountered was the wild almond, *Prunus fasciculata*, Gray. *Gilia Parryæ*, Gray, and *G. dichotoma*, Benth., are here abundant. Throughout the day the latter can scarcely be observed, its convoluted tube being tightly closed, is inconspicuous; but at five in the afternoon all is changed. The plants of *Gilia Parryæ*, that all day sparkled like daisies in the sun, have closed, and in the space of ten or fifteen minutes, *Gilia dichotoma* has unrolled its petals and filled the air with sweet fragrance. With the appearance of the morning sun *Gilia dichotoma* goes to sleep again, and *Gilia Parryæ* opens. A few specimens of *Collinsia Childsii*, Parry, gathered here had such congested branches as to appear new to me, but Dr. Robinson of Harvard, who examined them, informs me that the same form was gathered by the Death Valley explorers. *Peucedanum dasycarpum*, T. & G., and *P. Parishii*, C. & R., were plentiful and in the shade of the pine trees, further on, *Leptotænia multifida*, Nutt., was coming into flower. *Chænactis Fremonti*, Gray, *C. stevioides*, H. & A., *C. Xantiana*, Gray (the two latter rare), with *Viola præmorsa*, Dougl., and *Arabis pulchra*, M. Jones, were here observed.

On the heights near the shore of the lake *Thermopsis Californica*, Wats., was growing, while around the water were a number of willows which presented a curious appearance on account of the long rootlets hanging from their branches six feet up, the result of a long continued overflow of water about six years ago.

Entering a cañon south of this, and passing over a high ridge into King's Cañon, gave us an opportunity of seeing some new shrubs. In the bottom of the watercourses and in King's Cañon a few trees of *Æsculus Californica*, Nutt., were found; doubtless they are to be found in all the moist cañons of the range. The pine trees here (alt. 3,500 ft.) are all *Pinus Sabiniana*, Dougl., while farther westwards *P.*

monophylla, Torr. & Frem., is more common at this altitude. The younger trees, with their large lateral and persistent cones, and long leaves, look quite handsome, but the older ones with gnarled and twisted trunks are unsymmetrical and ragged. A few trees of *Forestiera Neo-Mexicana*, Gray, occupying a shady slope, and *Ceanothus vestitus*, Greene, and *C. divaricatus*, Nutt., the only representatives of this family, were noted. Some of the hillsides, devoid of brush and almost wholly covered with *Lupinus Chamissonis*, var. *longifolius*, Wats., presented quite a gorgeous appearance. On the richer banks along the path, *Syntrichopappus Lemmoni*, Gray, *Troximon retrorsum*, Gray, *Microseris linearifolia*, Gray, with glandular peduncules, *Lotus leucophyllus*, Greene, and *Eulophus Pringlei*, C. & R., were in flower. At the head of King's Cañon, *Claytonia spathulata*, Dougl., and *Pentstemon ternatus*, Torr., grew rather sparingly.

Around Lancaster the majority of the spring plants were in bloom and the following less common species were observed and deemed worthy of record:

Gilia tricolor, Benth.
G. Matthewsi, Gray.
G. floccosa, Gray.
G. latiflora, Gray.
G. inconspicua, Dougl.
Malacothrix glabrata, Gray.
M. sonchoides, T. & G.
Glyptopleura setulosa, Gray.
Anisocoma acaule, T. & G.
Rafinesquia Neo-Mexicana, Gray.
Aplopappus interior, Coville
Streptanthus inflatus, Greene
Lepidium Fremonti, Wats.
Delphinium recurvatum, Greene.
Canbya candida, Parry.
Astragalus dispermus, Gray
Astragalus acutirostris, Wats.
Lupinus Shockleyi, Wats.
Œnothera gauræflora, T. & G.
Œ. Palmeri, Wats.
Œ. caespitosa, Nutt.
Œ. brevipes, Gray.
Œ. dentata, Cavanilles, var. *grandiflora*, Wats.
Coldenia brevicalyx, Wats.
Pectocarya setosa, Gray.
Phacelia bicolor, Torr.
P. Mohavensis, Gray.
Nama pusillum, Lemmon.
Malva exile, Gray.
Sphæralcea ambigua, Gray.
Lycium Cooperi, Gray.

Castilleia plagiotoma, Gray.
C. affinis, H. & A.
Eriogonum delicatulum, Wats.
E. crenulatum, Parry.
E. angulosum, Benth.
Chorizanthe brevicornu, Torr.
Oxytheca luteola, Parry.
Calochortus flexuosus, Wats.
C. Kennedyi, Porter.
Salsola Kali, L.

The last, the Russian Thistle, is a recent importation, having been first observed two years ago, though, from the number of plants then existing, it had probably been introduced two years prior to that. Be this as it may, there is no doubt of its existence now over a considerable area of the desert lands. It grows freely in the streets of Lancaster, or in any ground where the surface is occasionally disturbed and is thus more likely to prove a pest in cultivated fields than in orchards or in open ground. I observed it near Del Sur, ten miles west of Lancaster, where it was probably carried by the wheels of passing teams, and it requires but a season or two more of neglect to be thus carried over all the roads in the valley. Ten miles to the south-west it is also established, and the local authorities, by way of exterminating the pest, have destroyed all the old and already fruited plants, and have left those of this season's growth to mature at will.

NOMENCLATURE AT THE SPRINGFIELD MEETING OF THE A. A. A. S.

By Charles Louis Pollard.

The meeting of the American Association for the Advancement of Science, held recently at Springfield, though less fully attended than usual, was certainly a success from a social and scientific point of view. So far as attendance is concerned, it is open to question whether the gatherings of various affiliated societies, held before and during the meetings of the Association, do not tend to diminish interest in the latter. A committee has been appointed to consider this point and to report at the Buffalo meeting next year. A very praiseworthy change has also been made in the date of assembling, and henceforth the general sessions will commence on Monday instead of Thursday as heretofore, allowing four days for the reading of papers, and Saturday for those who wish to take the excursions offered.

Undoubtedly the chief interest of many of the botanists present centered in the proceedings of the Botanical Club. It was known that the Nomenclature Committee appointed at Rochester three years ago would render a report at this meeting, and in view of the public discussion which the subject of botanical nomenclature has evoked during recent years, the report and action thereon were expected with interest.

The Club was organized on Thursday by the election of Judge David F. Day as temporary Chairman, and H. C. Bolley as Secretary. On the following morning, when the Club was called to order, Dr. Britton reported for the Committee that the Check List of North-eastern North American Plants had been completed in accordance with instructions, and without expense to the Club. In view of the importance of the subject, action was deferred until a special meeting of the Club at four o'clock on Friday, called for the purpose of discussing the report. On Friday afternoon, accordingly, a large number of botanists and others interested assembled. The chair was occupied by the President, Professor Douglas H. Campbell, who had arrived during the day. The gathering probably represented all phases of opinion, and nearly all sections of the country.

The motion to accept the committee's report, which had been made at the morning session, was first taken up, and after some discussion as to the effect of its adoption, was carried unanimously. Dr. B. L. Robinson then offered some criticisms on the results of the committee's work, directed chiefly against such corrections of spelling as *Koniga* for the original *Konig*, and contended that the strict application of the law of priority should exclude all alterations of generic names. In reply it was admitted that the work of the committee was not altogether free from mistakes, but that in the judgment of a majority of the members, typographical or other obvious errors in orthography (as *Scoria* for *Hicoria*) should be corrected. A mistaken impression has prevailed in some quarters that the Check List is to be regarded as infallible; it is, however, merely an illustration of the practical application of a stable and systematic code of nomenclature, requiring much careful revision and the labor of numerous specialists to bring it to the highest degree of utility. Mr. M. A. Carleton urged that no further steps be taken until an international congress could be brought to consider the whole subject of botanical nomenclature. It was observed, however, that the first attempt to bring order out of chaos in the matter of plant names originated in France only, and that British botanists were as reluctant then as now to participate in any movement of reform. In this connection Professor Britton's notes on the last edition of the London Catalogue of British Plants, given before Section G on Friday morning, are of great interest. In this Catalogue a number of older generic names have been adopted, most of which are identical with those accepted by the authors of the Check List; thus, *Castalia* replaces *Nymphaea*, *Nymphaea* supplants *Nuphar*, *Senebiera* becomes *Coronopus*, and so on. There are thus only 18 different generic names, with about 440 in common. In view of the fact that Engler and Prantl, in "Die Naturlichen Pflanzenfamilien" adopt in most cases these same names, the circumstance affords a striking object lesson to those who would have us believe that the movement in favor of the law of priority is local in both scope and origin.

Discussion at the meeting was terminated by the introduction of a resolution by Dr. Britton as follows:

Resolved: That in view of the opinions expressed both at home and abroad, the matter be referred to the Committee for discussion, and report next year, and that the Committee be increased by the addition of Professor C. S. Sargent and Dr. B. L. Robinson.

Upon the refusal of the latter to serve, Professor L. H. Bailey was elected as a member of the Committee. The meeting then adjourned until Monday morning, when the following officers were chosen for 1896: President, Mr. Frederick V. Coville; Vice-President, Professor Conway MacMillan; Secretary and Treasurer, Mr. J. F. Cowell.

The subject of botanical nomenclature then, so far as further or supplementary action by the Botanical Club is concerned, is deferred, and the principles adopted at Rochester and Madison remain unchanged. The fact that in spite of the large attendance of conservative botanists the main principles of the code were not once attacked, proves conclusively, it would seem, that its ultimate acceptance has become assured. The constantly multiplying disadvantages of a system under which it is possible to assign a dozen different names to the same plant cannot fail to impress the great majority of botanical workers in all countries.

MISCELLANEOUS NOTES AND NEWS.

THE FIRST fascicle of Vol. i, Part I, of the Synoptical Flora of North America is announced as ready. This is the first portion of the work to appear since the death of Gray, the preparation of the manuscript having been carried on by Dr. B. L. Robinson. The original plan has been followed and the treatment of the Polypetalous orders will form when completed, Vol. i, Part I. The first fascicle includes seventeen orders, Ranunculaceæ, Cruciferæ, Violaceæ, etc. In the preparation of the manuscript for the second fascicle, which is to appear at an early date, Dr. Robinson will be assisted by Professors Coulter, Trelease and Bailey.

THE fourth and last part of the Index Kewensis has been issued.

Kerner and **Oliver**'s Natural History of Plants is now completed.

J. G. **Lemmon**, familiar as a field student of western pines and firs, published in July, 1895, a small volume which he calls "Handbook of West-American Cone-Bearers." Besides the systematic arrangement of the species the author comments on the aspect of the pines and the impression made upon the beholder. The Handbook will undoubtedly be of good service to those who desire an easy guide to the scientific and common names of our coniferae. There are a number of illustrations of fruiting branches.

An annotated list entitled "Flora of Pasadena and Vicinity," of which Professor A. J. McClatchie of the Throop Polytechnic Institute is the author, has been sent to us in the form of a reprint from a local history. The list is unique among local catalogues hitherto published in California in that plants of all orders of the vegetable kingdom are included—not excepting the most simple forms. Typographical errors are rather frequent. The author, who has worked zealously on the vegetation of his region, was not given opportunity, we judge, to make corrections.

It is announced that Mr. B. Daydon Jackson, Secretary of the Linnean Society, so well-known as the compiler of the "Guide to the Literature of Botany and Vegetable Technology," but especially of the "Index Kewensis," will shortly devote his energies to the publication of a new edition of Pritzel's famous "Thesaurus Literaturae Botanicae."

C. G. **Lloyd** of Cincinnati, Ohio, distributed early in the year a set of three photographs of American fungi. These photographs are very creditable productions showing well the characteristic features of the plants. Another set (Nos. 4-7) has lately been issued by a photo-gravure process. It is now proposed to reissue as photo-gravures the first three plates distributed and eventually furnish text with each plate and an index to the whole when completed.

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WILLIS L. JEPSON,
Berkeley, California.

PRESIDENTIAL ADDRESS TO THE BOTANICAL SECTION OF THE BRITISH ASSOCIATION.[1]

By W. T. **Thiselton-Dyer**, M. A., F. R. S.
Director of the Royal Gardens, Kew.

The establishment of a new Section of the British Association, devoted to Botany, cannot but be regarded by the botanists of this country as an event of the greatest importance.

I confess I found it a great temptation to review, however imperfectly, the history and fortunes of our subject while it belonged to Section D. [Biology]. But to have done so would have been practically to have written the history of botany in this country since the first third of the century. Yet I cannot pass over some few striking events.

I think that the earliest of these must undoubtedly be regarded as the most epoch-making. I mean the formal publication by the Linnean Society, in 1833, of the first description of 'the nucleus of the cell,' by Robert Brown.[2] It seems difficult to realize that this may be within the recollection of some who are now living amongst us. It is, however, of peculiar interest to me that the first person who actually distinguished this all-important body and indicated it in a figure, was Francis Bauer, thirty years earlier, in 1802. This remarkable man, whose skill in applying the resources of art to the illustration of plant anatomy has never, I suppose, been surpassed, was resident draughtsman for fifty years to the Royal Botanic Garden at Kew. And it was at Kew, and in a tropical orchid, *Phaius grandifolius*, no doubt grown there, that the discovery was made.

It was, I confess, with no little admiration that, on refreshing my memory by a reference to Robert Brown's paper, I

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[1] Delivered at the inauguration of Section K, (Botany) of the British Association for the Advancement of Science, at Ipswich, September 12, 1895, and reprinted by kind permission of the author. A few paragraphs of less general interest have been omitted through lack of space.

[2] *Misc. Bot. Works*, i. 512.

read again the vivid account which he gives in a footnote of the phenomena, so painfully familiar to many of us who have been teachers, exhibited in the staminal hair of *Tradescantia.* Sir Joseph Hooker[3] has well remarked that 'the supreme importance of this observation,....leading to undreamt-of conceptions of the fundamental phenomena of organic life, is acknowledged by all investigators.' It is singular that so profound an observer as Robert Brown should have himself missed the significance of what he saw. The world had to wait for the discovery of protoplasm by Von Mohl till 1846, and till 1850 for its identification with the sarcode of zoologists by Cohn, who is still, I am happy to say, living and at work, and to whom last year the Linnean Society did itself the honor of presenting its medal.

The Edinburgh meeting of the Association, in 1834, was the occasion of the announcement of another memorable discovery of Robert Brown's. I will content myself with quoting Hofmeister's[4] account of it. 'Robert Brown was the discoverer of the polyembryony of the *Coniferæ.* In a later treatise he pointed out the origin of the pro-embryo in large cells of the endosperm, to which he gave the name of corpuscula.' The period of the forties, just half a century ago, looks in the retrospect as one of almost dazzling discovery. To say nothing of the formal appearance of protoplasm on the scene, the foundations were being laid in all directions, of our modern botanical morphology. Yet its contemporaries viewed it with a very philosophical calm. Thwaites, who regarded Carpenter as his master, described at the Oxford meeting in 1847 the conjugation of the *Diatomaceæ*, and 'distinctly indicated,' as Carpenter[5] says, 'that conjugation is the primitive phase of sexual reproduction.' Berkeley informed me that the announcement fell perfectly flat. A year or two later, Suminski came to London with his splendid discovery (1848) of the archegonia of the fern, the antheridia having been first seen by Nägeli in 1844. Carpenter [6] gave me, many years after, a curious account of its reception. 'At the Council of the Ray Society, at which,' he said, 'I advocated the reproduction of Suminski's book on the "Ferns," I was assured that the close resemblance of the antherozoids to spermatozoa was quite sufficient proof that they could have nothing to do with vegetable reproduction. 'I do not think,' he added—and the complaint is pathetic—'that the men of the present generation, who have been brought up in the *light*, quite apprehend (in this as in other matters) the utter darkness in which we were then groping, or fully recognise the deserts of those who helped them to what they now enjoy.' This was in 1875, and I suppose is not likely to be less true now.

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[3] *Proc. Linn. Soc.*, 1887–88, 65.

[4] *Higher Cryptogamia*, 432.

[5] *Memorial Sketch*, 140.

The Oxford Meeting in 1860 was the scene of the memorable debate on the origin of species, at which it is interesting to remember that Henslow presided. On that occasion Section D. reached its meridian. The battle was Homeric. However little to the taste of its author, the launching of his great theory was, at any rate, dignified with a not inconsiderable explosion. It may be that it is not given to the men of our day to ruffle the dull level of public placidity with disturbing and far-reaching ideas. But if it were, I doubt whether we have, or need now, the fierce energy which inspired then either the attack or the defence. When we met again in Oxford last year the champion of the old conflict stood in the place of honor, acclaimed of all men, a beautiful and venerable figure. We did not know then that that was to be his farewell.

The battle was not in vain. Six years afterwards, at Nottingham, Sir Joseph Hooker delivered his classical lecture on Insular Floras. It implicitly accepted the new doctrine, and applied it with admirable effect to a field which had long waited for an illuminating principle. The lecture itself has since remained one of the corner-stones of that rational theory of the geographical distribution of plants which may, I think, be claimed fairly as of purely English origin.

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[6] *Memorial Sketch*, 141.

HENSLOW.

There is one name written in the annals of our old Section which I cannot pass over—that of Henslow. I suppose there are few men of this century who have indirectly more influenced the current of human thought. For in a great measure I think it will not be contested that we owe Darwin to him. As Romanes has told us:[7] 'His letters written to Professor Henslow during his voyage round the world overflow with feelings of affection, veneration, and obligation to his accomplished master and dearest friend—feelings which throughout his life he retained with no diminished intensity. As he used himself to say, before he knew Professor Henslow the only objects he cared for were foxes and partridges.' I do not wish to overstate the facts. The possession of 'the collector's instinct, strong in Darwin from his childhood, as is usually the case in great naturalists,' to use Huxley's[8] words, would have borne its usual fruit in after life, in some shape or other, even if Darwin had not fallen into Henslow's hands. But then the particular train of events which culminated in the great work of his life would never have been started. It appeared to me, then, that it would not be an altogether uninteresting investigation to ascertain something about Henslow himself. The result has been to provide me with several texts, which I think it may be not unprofitable to dwell upon on the present occasion.

In the first place, what was the secret of his influence over Darwin? 'My dear old master in Natural History' ('Life,' ii, 317) he calls him; and to have stood in this relation to Darwin[9] is no small matter. Again, he speaks of his friendship with him as 'a circumstance which influenced my whole career more than any other' (i. 52). The singular beauty of Henslow's character, to which Darwin himself bore noble testimony, would count for something, but it would not in itself be a sufficient explanation. Nor was it that intellectual fascination which often binds pupils to the master's feet; for, as Darwin tells us, 'I do not suppose that anyone would say that he possessed much original genius' (i. 52). The real attraction seems to me to be found in Henslow's possession, in an extraordinary degree, of what may be called the Natural History spirit. This resolves itself into keen observation and a lively interest in the facts observed. 'His strongest taste was to draw conclusions from long-continued minute observations' (i. 52). The old Natural History method, of which it seems to me that Henslow was so striking an embodiment, is now, and I think unhappily, almost a thing of the past. The modern university student of botany puts his elders to blush by his minute knowledge of some small point in vegetable histology. But he can tell you little of the contents of a country hedgerow; and if you put an unfamiliar plant in his hands he is pretty much at loss how to set about recognising its affinities. Disdaining the field of nature spread at his feet in his own country, he either seeks salvation in a German laboratory or hurries off to the Tropics, convinced that he will at once immortalise himself. But '*cœlum non animum mutat*'; he puts into 'pickle' the same objects as his predecessors, never to be looked at again; or perhaps writes a paper on some obvious phenomena which he could have studied with less fatigue in the Palm House at Kew.

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[7] *Memorial Notices*, 13. [8] *Proc. R. S.*, xliv. vi. [9] As I shall have frequent occasion to quote the *Life and Letters*, I shall insert the references in the text.

The secret of the right use of travel is the possession of the Natural History instinct, and to those who contemplate it I can only recommend a careful study of Darwin's 'Naturalist's Voyage.' Nothing that came in his way seems to have evaded him or to have seemed too inconsiderable for attention. No doubt some respectable travellers have lost themselves in a maze of observations that have led to nothing. But the example of Darwin, and I might add of Wallace, of Huxley and of Moseley, show that that result is the fault of the man and not of the method. The right moment comes when the fruitful opportunity arrives to him who can seize it. The first strain of the prelude with which the 'Origin' commences are these words: 'When on board H. M. S. "Beagle" as naturalist, I was much struck with certain facts in the distribution of the organic beings inhabiting South America.' But this sort of vein is not struck at hazard or by him who has not served a tolerably long apprenticeship to the work.

When one reads and re-reads the 'Voyage,' it is simply amazing to see how much could be achieved with a previous training which we now should think ludicrously inadequate. Before Henslow's time the state of the natural sciences at Cambridge was incredible. In fact, Leonard Jenyns,[10] his biographer, speaks of the 'utter disregard paid to Natural History in the University previous to his taking up his residence there.' The Professor of Botany had delivered no lectures for thirty years, and though Sir James Smith, the founder of the Linnean Society, had offered his services, they were declined on the ground of his being a Nonconformist.[11]

As to Henslow's own scientific work, I can but rely on the judgment of those who could appreciate it in relation to its time. According to Berkeley,[12] he was certainly one of the first, if not the very first, to see that two forms of fruit might exist in the same fungus.' And this, as we now know, was a fundamental advance in this branch of morphology. Sir Joseph Hooker tells me that his papers were all distinctly in advance of his day. Before occupying the chair of botany, he held for some years that of mineralogy. Probably he owed this to his paper on the Isle of Anglesey, published when he was only twenty-six. I learn from the same authority that this to some extent anticipated, but at any rate strongly influenced, Sedgwick's subsequent work in the same region.

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[10] *Memoir*, 175.

[11] *Ibid.*, 37.

[12] *Ibid.*, 56,

BOTANICAL TEACHING.

Henslow's method of teaching deserves study. Darwin says of his lectures 'that he liked them much for their extreme clearness.' 'But,' he adds, 'I did not study botany' (i. 48). Yet we must not take this too seriously. Darwin,[13] when at the Galapagos, 'indiscriminately collected everything in flower on the different islands, and fortunately kept my collections separate.' Fortunately indeed; for it was the results extracted from these collections, when worked up subsequently by Sir Joseph Hooker, which determined the main work of his life. 'It was such cases as that of the Galapagos Archipelago which chiefly led me to study the origin of species' (iii. 159).

Henslow's actual method of teaching went some way to anticipate the practical methods of which we are all so proud 'He was the first to introduce into the botanical examination for degrees in London the system of practical examination.'[14] But there was a direct simplicity about his class arrangements characteristic of the man. 'A large number of specimens....were placed in baskets on a side-table in the lecture room, with a number of wooden plates and other requisites for dissecting them after a rough fashion, each student providing himself with what he wanted before taking his seat.'[15] I do not doubt that the results were, in their way, as efficient as we obtain now in more stately laboratories.

The most interesting feature about his teaching was not, however, its academic aspect, but the use he made of botany as a general educational instrument. 'He always held that a man of *no* powers of observation was quite an exception.'[16]

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[13] *Voyage*, 421. [14] *Memoir*, 161. [15] *Ibid.*, 39. [16] *Ibid.*, 163

He thought (and I think he proved) that botany might be used 'for strengthening the observant faculties and expanding the reasoning powers of children in all classes of society.'[17] The difficulty with which those who undertake now to teach our subject have to deal is that most people ask the question, What is the use of learning botany unless one means to be a botanist? It might indeed be replied that as the vast majority of people never learn anything effectively, they might as well try botany as anything else. But Henslow looked only to the mental discipline; and it was characteristic of the man and of his belief in his methods that when he was summoned to Court to lecture to the Royal family, his lectures 'were, in all respects, identical with those he was in the habit of giving to his little Hitcham scholars,'[18] and it must be added that they were not less successful.

This success naturally attracted attention. Botanical teaching in schools was taken up by the Government, and continues to receive support to the present day. But the primitive spirit has, I am afraid, evaporated. The measurement of results by means of examination has been fatal to its survival. The teacher has to keep steadily before his eyes the necessity of earning his grant. The educational problem retires into the background. 'The strengthening of the observant faculties,' and the rest of the Henslowian programme must give way to the imperious necessity of presenting to the examiner candidates equipped with at least the minimum of text-book formulas reproducible on paper. I do not speak in this matter without painful experience. The most astute examiner is defeated by the still more astute crammer. The objective basis of the study on which its whole usefulness is built up is promptly thrown aside. If you supply the apple blossom for actual description, you are as likely as not to be furnished with a detailed account of a buttercup. The training of observation has gone by the board, and the exercise of mere memory has taken its place. But a table of logarithms or a Hebrew grammar would serve this purpose equally well. Yet I do not despair of Henslow's work still bearing fruit. The examination system will collapse from the sheer impossibility of carrying it on beyond a certain point. Freed from its trammels, the teacher will have greater scope for individuality, and the result of his labors will be rewarded after some intelligent system of inspection. And here I may claim support from an unexpected quarter. Mr. Gladstone has recently written to a correspondent:—'I think that the neglect of natural history, in all its multitude of branches, was the grossest defect of our old system of training for the young; and, further, that little or nothing has been done by way of remedy for that defect in the attempts made to alter or reform that system.' I am sure that the importance and weight of this testimony, coming as it does from one whose training and sympathies have always been literary, cannot be denied.

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[17] *Memoir*, 99. [18] *Ibid.*, 149.

OLD SCHOOL OF NATURAL HISTORY.

If the old school of natural history of which Henslow in his day was a living spirit is at present, as seems to be the case, continually losing its hold upon us, this has certainly not been due to its want of value as an educational discipline, or to its sterility in contributing new ideas to human knowledge. Darwin's 'Origin of Species' may certainly be regarded as its offspring, and of this Huxley[19] says with justice: 'It is doubtful if any single book, except the "Principia," ever worked so great and rapid a revolution in science, or made so deep an impression on the general mind.' Yet Darwin's biographer, in that admirable Life which ranks with the few really great biographies in our language, remarks (i. 155): 'In reading his books one is reminded of the older naturalists rather than of the modern school of writers. He was a naturalist in the old sense of the word, that is, a man who works at many branches of science, not merely a specialist in one.' This is no doubt true, but does not exactly hit off the distinction between the kind of study which has gone out of fashion and that which has come in. The older workers in biology were occupied mainly with the external or, at any rate, grosser features of organisms and their relation to surrounding conditions; the modern, on the other hand, are engaged on the study of internal and intimate structure. Work in the laboratory, with its necessary limitations, takes the place of research in the field. One may almost, in fact, say that the use of the compound microscope divides the two classes. Asa Gray has compared Robert Brown with Darwin as the 'two British naturalists' who have, 'more than any others, impressed their influence upon science in the nineteenth century.'[20] Now it is noteworthy that Robert Brown did all his work with a simple microscope. And Francis Darwin writes of his father: 'It strikes us nowadays as extraordinary that he should have had no compound microscope when he went his "Beagle" voyage; but in this he followed the advice of Robert Brown, who was an authority on such matters' (i. 145). One often meets with persons, and sometimes of no small eminence, who speak as if there were some necessary antagonism between the old and the new studies. Thus I have heard a distinguished systematist describe the microscope as a curse, and a no less distinguished morphologist speak of a herbarium having its proper place on a bonfire. To me I confess this anathematisation of the instruments of research proper to any branch of our subject is not easily intelligible. Yet in the case of Darwin himself it is certain that if his earlier work may be said to rest solely on the older methods, his later researches take their place with the work of the new school. At our last meeting Pfeffer vindicated one of his latest and most important observations.

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[19] *Proc. R. S.*, xliv. xvii.

The case of Robert Brown is even more striking. He is equally great whether we class him with the older or the modern school. In fact, so far as botany in this country is concerned, he may be regarded as the founder of the latter. It is to him that we owe the establishment of the structure of the ovule and its development into the seed. Even more important were the discoveries to which I have already referred, which ultimately led to the establishment of the group of Gymnosperms. 'No more important discovery,' says Sachs,[21] 'was ever made in the domain of comparative morphology and systematic botany. The first steps towards this result, which was clearly brought out by Hofmeister twenty-five years later, were secured by Robert Brown's researches, and he was incidentally led to these researches by some difficulties in the construction of the seed of an Australian genus.' Yet it may be remembered that he began his career as naturalist to Flinder's expedition for the exploration of Australia. He returned to England with 4,000 'for the most part new species of plants.' And these have formed the foundation of our knowledge of the flora of that continent. Brown's chief work was done between 1820 and 1840, and, as Sachs[22] tells us, 'was better appreciated during that time in Germany than in any other country.'

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[20] *Nature*, x. 80.

MODERN SCHOOL.

The real founder of the modern teaching in this country in both branches of biology I cannot doubt was Carpenter. The first edition of his admirable 'Principles of Comparative Physiology' was published in 1838, the last in 1854. All who owe, as I do, a deep debt of gratitude to that book will agree with Huxley[23] in regarding it as 'by far the best general survey of the whole field of life and of the broad principles of biology which had been produced up to the time of its publication. Indeed,' he adds, 'although the fourth edition is now in many respects out of date, I do not know its equal for breadth of view, sobriety of speculation, and accuracy of detail.'

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[21] *History*, 142.

[22] *Loc. cit.*, 139, 140.

[23] *Memorial Sketch*, 67.

The charm of a wide and philosophic survey of the different forms under which life presents itself could not but attract the attention of teachers. Rolleston elaborated a course of instruction in zoology at Oxford in which the structures described in the lecture-room were subsequently worked out in the laboratory. In 1872 Huxley organised the memorable course in elementary biology at South Kensington which has since, in its essential features, been adopted throughout the country. In the following year, during Huxley's absence abroad through ill-health, I arranged, at his request, a course of instruction on the same lines for the Vegetable Kingdom.

That the development of the new teaching was inevitable can hardly be doubted, and I for my part am not disposed to regret the share I took in it. But it was not obvious, and certainly it was not expected, that it would to so large an extent cut the ground from under the feet of the old Natural History studies. The consequences are rather serious, and I think it is worth while pointing them out.

In a vast empire like our own there is a good deal of work to be done and a good many posts to be filled, for which the old Natural History training was not merely a useful but even a necessary preparation. But at the present time the universities almost entirely fail to supply men suited to the work. They neither care to collect, nor have they the skilled aptitude for observation. Then, though this country is possessed at home of incomparable stores of accumulated material, the class of competent amateurs who were mostly trained at our universities and who did such good service in working that material out is fast disappearing. It may not be easy indeed in the future to fill important posts even in this country with men possessing the necessary qualifications. But there was still another source of naturalists, even more useful, which has practically dried up. It is an interesting fact that the large majority of men of the last generation who have won distinction in this field have begun their career with the study of medicine. That the kind of training that Natural History studies give is of advantage to students of medicine which, rightly regarded, is itself a Natural History study, can hardly be denied. But the exigencies of the medical curriculum have crowded them out: and this, I am afraid, must be accepted as irremediable. I cannot refrain from reading you, on this point, an extract from a letter which I have received from a distinguished official lately entrusted with an important foreign mission. I should add that he had himself been trained in the old way.

'I have had my time, and must leave to younger men the delight of working these interesting fields. Such chances never will occur again, for roads are now being made and ways cut in the jungle and forest, and you have at hand all sorts of trees level on the ground ready for study. These bring down with them orchids, ferns, and climbers of many kinds, including rattan palms, etc. But, excellent as are the officers who devote their energy to thus opening up this country, there is not one man who knows a palm from a dragon-tree, so the chance is lost. Strange to say, the medical men of the Government service know less and care less for Natural History than the military men, who at least regret they have no training or study to enable them to take an intelligent interest in what they see around them. A doctor nowadays cares for no living thing larger or more complicated than a *bacterium* or a *bacillus*.'

But there are other and even more serious grounds why the present dominance of one aspect of our subject is a matter for regret. In the concluding chapter of the 'Origin,' Darwin wrote; 'I look with confidence to the future—to young and rising naturalists.' But I observe that most of the new writers on the Darwinian theory, and oddly enough, especially when they have been trained at Cambridge, generally begin by more or less rejecting it as a theory of the origin of species, and then proceed unhesitatingly to reconstruct it. The attempt rarely seems to me successful, perhaps because the limits of the laboratory are unfavorable to the accumulation of the class of observations which are suitable for the purpose. The laboratory, in fact, has not contributed much to the Darwinian theory, except the 'Law of Recapitulation,' and that, I am told, is going out of fashion.

The Darwinian theory, being, as I have attempted to show, the outcome of the Natural History method, rested at every point on a copious basis of fact and observation. This, more modern speculation lacks. The result is a revival of transcendentalism. Of this we have had a copious crop in this country, but it is quite put in the shade by that with which we have been supplied from America. Perhaps the most remarkable feature is the persistent vitality of Lamarckism. As Darwin remarks: 'Lamarck's one suggestion as to the cause of the gradual modification of species—effort excited by change of conditions--was, on the face of it, inapplicable to the whole vegetable world' (ii. 189). And if we fall back on the inherited direct effect of change of conditions, though Darwin admits that 'physical conditions have a more direct effect on plants than on animals' (ii. 319), I have never been able to convince myself that that effect is inherited. I will give one illustration. The difference in habit of even the same species of plant when grown under mountain and lowland conditions is a matter of general observation. It would be difficult to imagine a case of 'acquired characters' more likely to be 'inherited.' But this does not seem to be the case. The recent careful research of Gaston Bonnier only confirms the experience of cultivators. 'The modifications acquired by the plant when transported for a definite time from the plains to the Alps, or *vice versa*, disappear at the end of the same period when the plant is restored to its original conditions.'[24]

Darwin, in an eloquent passage, which is too long for me to quote,[25] has shown how enormously the interest of Natural History is enhanced 'when we regard every production of Nature as one which has had a long history,' and 'when we contemplate every complex structure....as the summing up of many contrivances.' But this can only be done, or at any rate begun, in the field and not in the laboratory.

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[24] *Ann. d. Sc. nat.*, 7ᵉ sér. xx. 355.

A more serious peril is the dying out amongst us of two branches of botanical study in which we have hitherto occupied a position of no small distinction. Apart from the staffs of our official institutions, there seems to be no one who either takes any interest in, or appreciates in the smallest degree, the importance of systematic and descriptive botany. And geographical distribution is almost in a worse plight, yet Darwin calls it, 'that grand subject, that almost keystone of the laws of creation' (i. 356).

I am aware that it is far easier to point out an evil than to remedy it. The teaching of botany at the present day has reached a pitch of excellence and earnestness which it has never reached before. That it is somewhat one-sided cannot probably be remedied without a subdivision of the subject and an increase in the number of teachers. If it has a positive fault, it is that it is sometimes inclined to be too dogmatic and deductive. Like Darwin, at any rate in a biological matter, 'I never feel convinced by deduction, even in the case of H. Spencer's writings' (iii. 168). The intellectual indolence of the student inclines him only too gladly to explain phenomena by referring them to 'ism,' instead of making them tell their own story.

(*To be Concluded*)

SHORT ARTICLES.

DATES OF PUBLICATION OF NUTTALL'S COMPOSITÆ.—The most important of all earlier contributions to the knowledge of Northwest American Compositæ is Nuttall's elaborate paper published in the Seventh Volume of the Second Series of *Transactions of the American Philosophical Society.* The volume bears on its title page the date 1841; and this was, until recently, always given as the date of Nuttall's paper. But in 1891, Dr. Otto Kuntze found evidence, in some European libraries, that the document in question had been in the hands of botanists in 1840.

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[25] *Origin*, 426.

A copy of the whole volume, now in the botanical library of the Catholic University at Washington explains the matter fully, and removes all doubt about the date, or rather, dates, of Nuttall's Compositæ.

The entire volume was published originally in three parts; each part being issued in a paper cover, with title, and date.

Part I, issued in 1840, has a long table of contents, but nothing botanical.

Part II, also issued in 1840, contains a portion of the *Descriptions of New Species and Genera of Plants in the natural Order of the* COMPOSITÆ, *collected in a Tour across the Continent to the Pacific*, etc., by Thomas Nuttall.

Part III, issued in 1841, contains the remainder of the paper above-named.

The dates, according to the paging, are as follows:

Pages 283 to 356, 1840.
" 357 to 453, 1841.

EDW. L. GREENE.

ARCTOSTAPHYLOS ELEGANS, JEPSON.—This form, I now decide, is to be referred to *A. manzanita*, Parry. I do not regard it as even worthy of a varietal name and so make record for the benefit of monographers and others. The name was published in this journal for January, 1893. (Vol. i. p. 15).

OPEN LETTERS.

Distribution of the Darlingtonia in Oregon.

THE *Darlingtonia Californica* grows plentifully in the Coast Mountains about the 42d parallel. It is to be found in all of the spring runs and swamps and along creeks—in fact in all wet places for many miles and I think this is the home of it and that the upper Sacramento localities are outlying stations. Growing with it are a number of other plants not generally known to range out of California, such as *Parnassia Californica, Aster Hendersonii, Helenium Bigelovii, Rudbeckia Californica, Cypripedium Californicum, Scirpus criniger* and others that I cannot now call to mind.

The geological formation in the region is a peculiar kind of serpentine and, for the most part, the lower portions of the mountains are well supplied with springs that run clear water all the year.

Yours,

THOS. HOWELL.

Clackamas, Oregon, 16 October, 1895.

MISCELLANEOUS NOTES AND NEWS.

THE Setember number of the *Bulletin de L'Herbier Boissier* contains among other articles the last installment of G. Lindau's monograph of American Acanthaceæ, and "Herborisations au Cost Rica," by Ad. Tonduz.

IN *Garden and Forest* of April 3, 1895 (viii, 134, f. 20) Mr. T. S. Brandegee described and figured a new Mimulus, *M. Clevelandi*, from the south side of Cuyamaca Peak, San Diego Co. It is a perennial woody species spreading by underground roots and said to be one of the handsomest members of the genus.

H. MARSHALL WARD, Professor of Botany, Royal Indian Engineering College, London, has been appointed to the professorship of Botany in Cambridge University, made vacant by the death of Prof. C. C. Babington.

We have received a copy of Fascicle I of the Synoptical Flora of North America, issued October 10. A review will appear in our next number.

The Field Columbian Museum has begun a series of botanical publications. Vol. 1, part I, consists of a paper entitled "Contribution to the Flora of Yucatan," by Charles Frederick Millspaugh, Curator of the Museum.

The Botanical Society of North America held its first annual meeting at Springfield, Mass., August 27 and 28. Charles E. Bessey was elected President for 1896. M. S. Bebb, Rockford, Ill.; W. A. Setchell, Berkeley; W. R. Dudley, Palo Alto, California; and D. P. Penhallow, Montreal, were elected members. Dr. A. W. Chapman was elected to honorary membership.

The Division of Botany has recently distributed the following numbers of Vol. III, contributions from the U. S. National Herbarium: No. 3, "Flora of the Sand Hills of Nebraska, by P. A. Rydberg; No. 4, "Report upon a Collection of Plants made by J. H. Sandberg and assistants in Northern Idaho in 1892," by John M. Holzinger.

ERRATA.

Page 5, line 21, for Brittanicarum read Britannicarum.
" 11, " 14, " Callfornia read California.
" 11, " 21, " Ericamera read Ericameria.
" 14, " 12, " stoloniferous read stoloniferus.
" 17, " 1, " semicinecta read semicincta.
" 33, " 23, " Williamette read Willamette.
" 49, " 11, " Anlerson read Alderson.
" 59, " 30, " macrantherum read macranthum.
" 59, " 31, " macranthera read macrantha.
" 60, " 24, " Stiveri read Stiversi.
" 77, " 24, " differ read differs.
" 91, " 1, " far-wastern read far-western.
" 97, " 2, " Umbellaria read Umbellularia.
" 149, " 23, " Guadeloupe read Guadelupe.
" 150, " 21, " plans read plan.

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